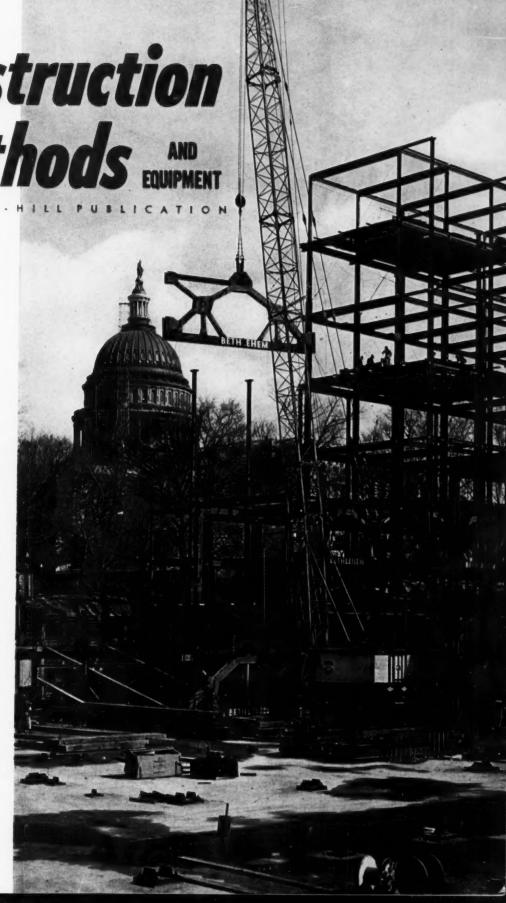


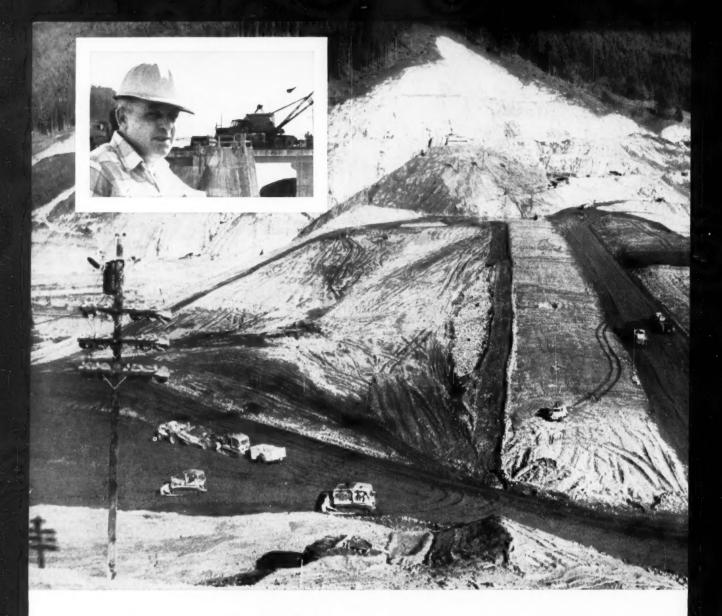
JUNE, 1960

PRICE \$1.00

With the Capitol as a backdrop, a husky 80-ton crane erects the steel skeleton of an office building for the House of Representatives. The truss it's handling is 39 ft long, 15 ft deep, weighs 14 tons.

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# Hills Creek Dam to drive two 30,000 K.W. generators

Hills Creek Dam is part of the \$42 million U. S. Corps of Engineers' Willamette Valley Project near Oak Ridge, Oregon. Green-Tecon, a joint venture of the Green Construction Company, Des Moines, Ia., and the Tecon Corporation of Dallas, Tex., has the earthmoving contract. This job involves II million yards of earth and gravel fill on the dam which totals 2400' in length, 1600' at the base and 24' at the crest. The dam will back up a 200,000 acre foot lake and will drive two 30,000 K.W. generators.

Green-Tecon has standardized on B & B "POWERSTEEL" on the job. "POWERSTEEL" is producing more yards on shovels, draglines,

hoist lines, scrapers and dozers! G-T men are enthusiastic about it. For example, Equipment Superintendent Howard Flake (shown above) made this typical comment: "POWERSTEEL" is really some rope! It's giving us excellent service and has certainly cut down on our rope changes!"

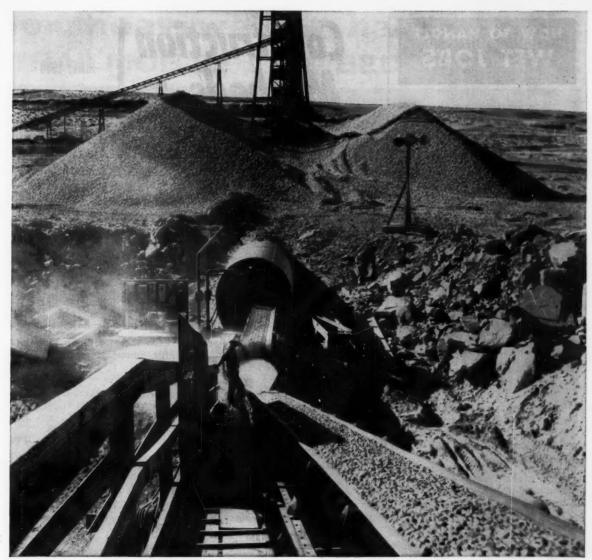
Yellow Strand "POWERSTEEL" is the strongest and toughest rope made at B & B and was developed especially for high speed, big production equipment. Your Yellow Strand Dealer has it in ample supply. See him soon! Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

HOLDEN STEEL''S









General Contractor: Marritt-Chapman & South Curp,

# Rubber sends mountains of rocks to help bottle up a river

MOUNTAINS of rocks, gravel and sand carried on those conveyor belts are made into concrete for a tremendous dam across the Colorado River. Engineers figure it will take 10 million tons of this stuff to build a towering 700 foot wall stretching 1500 feet across the canyon. But contractors can't afford to have any delays caused by belts breaking down—thousands of men would be made idle.

B.F.Goodrich men, working with the contractors, suggested they use conveyor belts made with Nyfil fabric. These belts use nylon for cross threads in the fabric. They were developed by B.F.Goodrich to make the belts so strong they can stand the wear and tear that caused other belts to break down. And, most important, they cost no more than other belts.

These B.F.Goodrich Nyfil belts have been working on the Glen Canyon Dam project for two years now — 16 hours a day, 5 days a week. There hasn't been a single breakdown and these belts are expected to give the same kind of service during the entire 5 or 6 years it will take to build the dam.

For complete information on the

conveyor belt described here and all the other rubber products B.F.Goodrich makes for industry, call your B.F.Goodrich distributor or write B.F.Goodrich Industrial Products Co., Dept. M-849, Akron 18, Ohio.



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#### INTERCEPTING SEWER

Staten Island, N. Y.

Contractor: Nicholas DiMenna & Sons



#### PUMP 20 MILLION GALS PER DAY TO KEEP SUBGRADE DRY

THE CENTER-LINE of this excavation was less than 300 ft from the Atlantic Ocean, which fairly flooded through the highly pervious

- The problem was to lower 28 ft of groundwater in a 30-ft cut for a new concrete intercepting sewerto do this on a site where contractors could recall previous experience of tough water-fighting at an excavation depth of only 16 ft, even with aid of wellpoints. Thus, the outlook was not exactly rosecolored.
- Yet the plan of the Griffin engineers and the efficiency of their pumps and wellpoints gave a sure. speedy solution. The truly enormous volume of 20 million gals per day was pumped under perfect control, keeping subgrade bone-dry and permitting economical open cut, except where sheeting was required (see photo) to protect existing sewers and structures.

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## Construction Methods AND EQUIPMEN

JUNE. 1960

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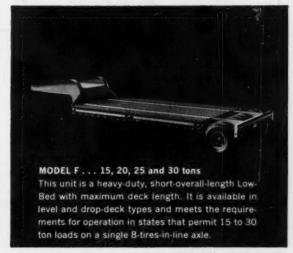
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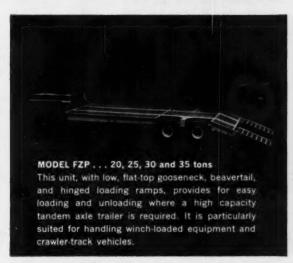
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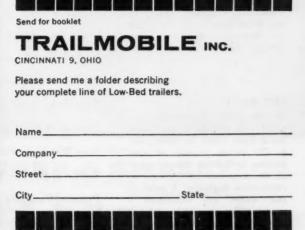














#### ON THE COVER

Bethlehem Steel Co. is fabricating and erecting 23,000 tons of structural steel, connected by more than 265,000 high-strength bolts, for the Additional House Office Bldg. in Washington. A Lima crane with a 150-ft boom and 30-ft jib works at the site of the 450x720-ft, nine-floor structure. Trusses, 166 of them, permit wide column spacing in three below-ground parking levels, yet support more closely spaced columns above. Bethlehem is subcontractor to McCloskey & Co.

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#### NEXT MONTH

For the twelfth consecutive year, CM&E will publish its Equipment Maintenance Guide for contractors. It will include a series of comparative specification chart for many of the most important classes of construction machinery. A series of case studies will supplement a special report on portable lubrication rigs and field practices.

#### Pay Dirt in This Issue

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This contractor avoided a lot of intricate formwork on a Denver Reservoir job by prebuilding traveling forms for a flat-slab roof as well as a unique vaulted concrete floor.



On their first prime contract as a roadbuilder, a New England drilling and blasting contractor is cashing in on many years of experience with tough rock projects.

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Keep Caissons Dry ....102

To déwater the site for a 100-ft-ID caisson, the contractor first tried wellpoints, then a pair of floating pumps, and finally had to add six deep wells to complete the job.







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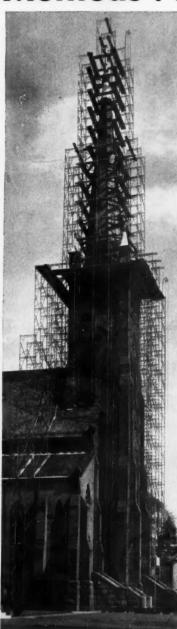




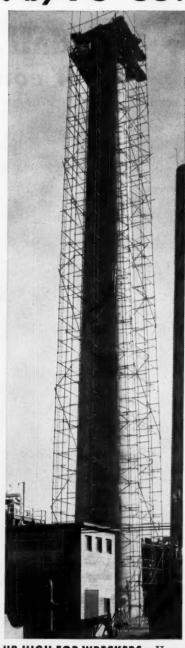
## Scaffolding Methods . . . by PS CO.



FAST MATERIAL LIFT—This 227'-high "Gold Medal"® Steel Hoist Tower is used by The Wm. Simpson Constr. Co. to move materials rapidly up when and where needed on the First Federal S. & L. Ass'n Bldg., Los Angeles.



OVERALL FOR STEEPLE JOB—To provide Eastern Renovating Contractors with safe, stable, wide, overall working platforms for steeple repairs, "Trouble Saver" Scaffolding is built up quickly from the ground and roof of this church in Wallingford, Conn.



UP HIGH FOR WRECKERS—Here, "TubeLox" tube and coupler Scaffolding is easily erected from only four basic parts to provide the height necessary for demolition of this concrete chimney in Torrance, Calif. Emsco Concrete Cutting Co., contractor.

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# LUBE LOGIC Five tips to

#### How to return stored engines to service

In a previous issue of Lube Logic we gave you an 11-point program designed to protect gasoline and diesel engines during long idle periods. Now we'd like to finish what we started by describing the routine for taking engines out of storage and putting them back into action.

■ Where Texaco Rustproof Compound L has been applied to exterior of engine, remove with kerosine.

Z Remove waterproof paper and tape from all openings.

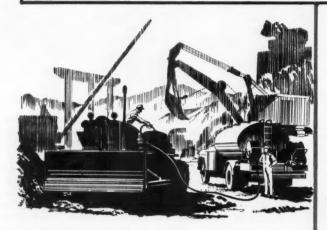
Remove spark plugs. Clean them and check the gap settings before replacing.

Remove distributor cap and clean Texaco Rustproof Compound L thoroughly from lobe of breaker cams. Replace cap.

5 Check the level of the crankcase oil. If it's at the full mark, there's no need to drain the oil before operating the engine unless it requires a different grade. If the oil has fallen below the full mark during storage, drain the engine and locate the oil leak, and repair it, then refill with the proper grade of oil, before operating the engine. The first oil change after the engine is back in service should be made in half the usual period.

Check the cooling system for leaks, and add water or Texaco PT Anti-Freeze if necessary. It's not necessary to drain and flush if the cooling system was filled with a rust-inhibited anti-freeze before storage.

Fill the fuel system, start the engine, and let it run for a while. Check the oil pressure, and check for overheating and oil and fuel leaks.



#### End-of-shift is the best fueling time

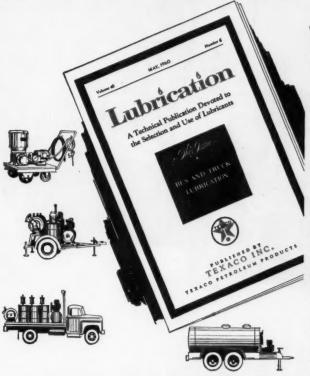
They say there's a time and a place for everything, and for refueling equipment the best time is at the end of each day's work. And here are two reasons why. End-of-shift minimizes the possibility of fuel-tank rusting, because there's no room for condensate to form in a tank that's full of gasoline or diesel fuel. And tank-bottom sediment, stirred up by pumping in fuel, has a chance to settle down overnight, so it won't be drawn into the fuel line.



Don't depend on your spark plug cleaner to do everything. As a matter of fact, you can actually make things worse by blasting an oil-fouled plug. Heavy oil deposits on the plug will pick up the abrasive and hold it in the recesses between the shell and the insulator. Result: burning and ultimate failure because these deposits can seriously affect the spark plug's ability to dissipate heat at high engine speeds.

Moral: degrease oil plugs in a suitable solvent and dry them before you blast.

# prolong equipment service life



# The whole truth about mobile LUBE RIGS

- What good lube rigs are made of—the products and the dispensing equipment.
- How to use lube records to make your rig more valuable.
- Special purpose lube rigs.
- · Pros and cons of mobile and centralized lubrication.

What does it take to make a mobile lube rig? What do you put on it? How do you use it? The questions have been coming in so fast lately that Texaco has devoted a whole issue of its magazine, *Lubrication*, to answering them: the March 1960 issue, titled "Mobile Lubrication Equipment."

Lubrication is a major factor in cost control, and lube rigs can be a major factor in thorough maintenance, so send for your free copy of the March *Lubrication*. Supply of these valuable booklets is limited, so if you want one, send in your request *now* to Texaco Inc., 135 East 42nd Street, New York 17, N.Y., Dept. CM-10.



Texaco's flexible new truck record folder lets you stick to the lube schedule that works best for you without running into bookkeeping problems. Lubrication and oil schedules are completely separate from mechanical maintenance and replacement parts schedule—you don't have to follow any pre-established routine to use the folder profitably. And this new folder accounts for every single dollar you spend on truck maintenance for a whole year. Get yours now.

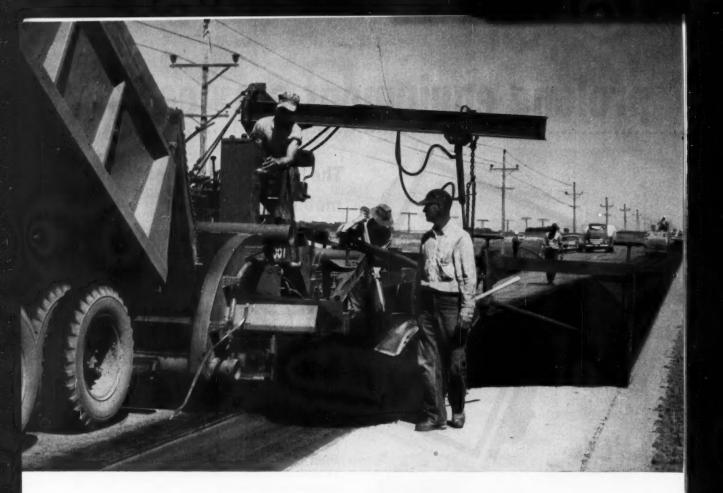
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Every now and then we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in money and time can be made. If Lube Logic doesn't solve your problems, call your local Texaco man. Anytime, all the time, he's your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control." Texaco Inc., 135 East 42nd Street, New York 17, N. Y.





Five contractors each bought a Barber-Greene Road Widener and Shoulder Paver after seeing W. Hodgeman and Sons' machine perform on this 20-mile widening and resurfacing contract on U. S. 212 near Birds Island, Minn. General Supt., George McPherson states: "The Barber-Greene is the only rig that could have met state specs on both 9-ft. base widening and 6-ft. shoulder paving at speeds to 70 fpm. We laid the base course of emulsified asphalt using the hydraulically controlled strike-off attachment. On the last pass where pre-compaction and automatic leveling were required, we changed to our tamping-leveling attachment. On the 6-ft. wide and 2½" thick finish course we averaged better than 200 tons of hot mix hourly. This is the first time we've been able

to handle this type job with one machine."

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SJ-50 paves 6-ft. asphalt shoulder around tight curve near Cheyenne, Wyo., without slowdown. Exclusive attachment, utilizing tamping-leveling principle with compaction before strike-off, assures finest work.





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#### Construction News From Washington

\_Washington, D.C. June, 1960

#### The Highway Scandal

The first round of hearings on the highway situation was just that —only the beginning.

From here on out you can count on a continuing investigation of the huge program that was created to give the nation a 41,000-mile network of superhighways by 1975.

Rep. John Blatnik's special subcommittee proved its main point—that there is need for an investigating committee—with a parade of witnesses involved in the construction and supervision of the so-called Skelly By-Pass—13.8 miles of interstate mileage near Tulsa, Okla. The project cost \$8.6-million, of which \$5.8-million was federal funds.

During the week of hearings, witnesses admitted that:

The road was not up to specifications;

State and federal officials were derelict in supervising the project;

Test reports on construction were falsified;

Payments were made for materials never delivered;

A state official was a silent partner in a firm to which he awarded business.

With this kind of record made out of the words of contractors, engineers, and state and federal officials, Blatnik could be sure of support in Congress for a virtually permanent investigating or watchdog committee to expose other cases of corruption and graft—and to try to keep additional ones from occurring.

#### More to Come?

No one is saying that the situation uncovered at Tulsa is prevalent in all federal highway construction, but there are hints that already the Blatnik investigators have found other contracts and practices that need exposure.

Also, Bureau of Public Roads was caught in a bad light. Their officials, after criticism of the highway had broken out in the local newspapers, made what they called an independent investigation, and gave the situation a complete bill of health.

The investigating Congressmen are able to make a fairly affirmative point: With some \$2-billion of federal tax money being pumped out each year for highways, a great deal of independent supervision and investigation is needed to keep this from becoming a gravy train.

#### **New BPR Tests Ordered**

Already, Highway Adiministrator Tallamy has ordered one unprecedented check of the quality of performance by contractors. He has directed all BPR field engineers personally to select, for independ-

ent tests, random points on all mileage under construction to see whether the finished product meets specifications. Some 9,000 or 10,000 federal projects are involved. Earlier BPR checks—on the Skelly By-Pass for instance—were based solely on documents submitted by the contractors and state officials involved.

#### AASHO Moves In

The Highway scandal also has caused the American Association of State Highway Officials to change its historic policy. Up to now. the organization has concerned itself only with the technical and engineering aspects of roadbuilding—setting up suggested specifications and standards as recommendations for states to adopt.

The association now plans to draw up recommendations that would provide standards that go beyond the letting of the contract—to cover the proper administration of contracts until the road is completed.

#### Politics Is Involved

There's politics in the highway investigation. Republicans and Democrats on the committee feuded over whether the Eisenhower Administration and its officials should properly bear part of the blame—or whether all the fault could be laid to state officials who admittedly have the key responsibility for letting contracts and seeing that they are carried out.

However, there's no sign that federal outlays for highway building will be cut back.

Eisenhower had asked for another one-half cent increase in the federal gasoline tax in order to build roads faster. But even before the hearings began, all signs indicated that Congress was in no mood to vote the increase of some \$300-million a year.

#### Military Construction Money

At a minimum, the military services will have \$1.6-billion of construction money for new contract awards in the next fiscal year.

This minimum was set by the House Appropriations Committee in the military construction money bill that it submitted to the law-makers just three days before the summit conference. The economy-minded committee had cut \$300-million from Defense Dept. construction requests.

As drafted by the committee during the pre-summit calm, the new money bill would add \$885-million to carryover appropriations of \$730-million still remaining in hand for contract awards next year.

Total spendable funds, of course, would add up to a bigger sum. They include \$1.4-billion previously appropriated but not yet paid out to contractors on going jobs.

In the committee bill, the Air Force was cut \$20-million to a recommended sum of \$536-million; the Army was trimmed down \$62-million to \$138-million; and the Navy was reduced \$36-million to \$161-million.

Dredging up 57,481,000 yards of river bottom in 8 seasons - with the hose still in good shape—was the best service these Mississippi River dredge operators had ever gotten. And they got it from special 38-inch Sand Suction Hose recommended by the G.T.M.-Goodyear Technical Man. This long, trouble-free operation was a real time- and money-saver, too. For every replacement of the hose-link between the dredge ladder and the suction line takes a full crew's efforts for 3 days. More important, the dredge is out of action all that time. So it's easy to see why this dredge operator has stayed with the G.T.M.'s longer-lasting hose.



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# "THESE TRAILS WOULD SHAKE THE CAB OFF AN ORDINARY TRUCK... BUT NOT OUR CHEVY"

Few trucks are subjected to the body-wracking beatings that are part of a day's work for this Chevrolet Series 60 pulpwood hauler, owned by J. E. Fox, North Carolina logging contractor. As Bobby Fox, a partner in the business points out, "Loaded full-up with pulpwood, we drive right over stumps and potholes you'd think would tear the truck to pieces. These trails would shake the cab off an ordinary truck, but not our Chevy. You can always replace chassis components, but when the cab goes, you have to buy a new truck. Chevies are built to hold together longer. That's why we buy 'em."

Mo matter where you haul, you'll profit by the new toughness that's built into Chevrolet's truck cabs for '60. You'll benefit from a cab that's constructed to stand up to slam-bang runs over rough terrain, a cab that stays in A-1 shape years longer. Here are some of the ways in which Chevy assures this tight, maintenance-minimizing performance: 1. Extra reinforcement where it counts reduces vibration; provides a solid foundation for cab sheet metal. Tough new longitudinal sills reinforce the underbody. 2. Extra-sturdy door openings—box-section pillars and sills assure lasting alignment. Doors stay weathertight with a minimum of maintenance. 3. New double-walled roof panels are sturdier than ever.

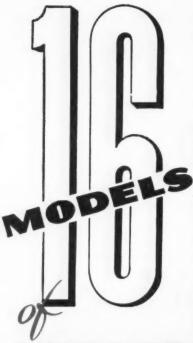


Husky box-section pillars provide the solid roof support that means greater safety and maximum cab strength. And there's a world of comfort for you, too. A wide seat, for instance, with a comfortable foam cushion and springs that soften the ride yet give you extra support where it's needed. And there's



more head, hip, shoulder and leg room for husky drivers... a horizon-wide windshield with 26% more glass area, a new see-at-a-glance instrument panel, new conveniently suspended pedals. First chance you get, visit your Chevrolet dealer and drive one of these new Chevies. Feel how Torsion-Spring Ride takes the bounce out of bumps; learn for yourself why it will lengthen truck life and lower maintenance costs. Check up on Chevy's famous gas-saving 6-cylinder and V8 engines. Then you'll know, for sure, why you can expect thousands of extra miles out of a Chevy; why you can be sure of more work per day at least expense.... Chevrolet Division of General Motors, Detroit 2, Michigan.

1960 CHEVROLET STURDI-BILT TRUCKS CHEVROLET



FULLER 3-SPEED

**AUXILIARIES** 

Specify fuller...

Specify the MODEL

Get the 3-speed auxiliary designed for your job.

HIGH CAPACITY... WIDEST RANGE
OF RATIOS... OPTIONAL TOPMOUNTED POWER TAKE-OFF...
LOW INITIAL COST, LESS MAINTENANCE... AVAILABLE FROM ALL
LEADING TRUCK MANUFACTURERS
ON SPECIFICATION

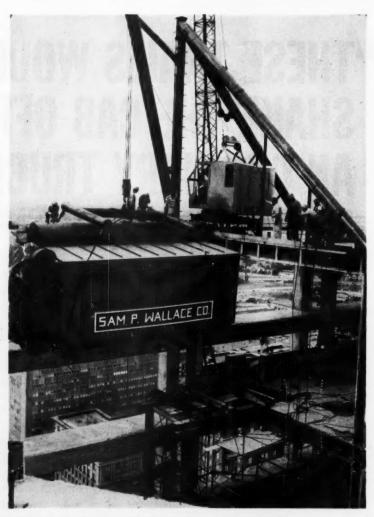
Specify the MODEL

Choose from 16 Models of FULLER Three-Speed Auxiliaries

FULLER MANUFACTURING COMPANY
(Transmission Division)

(Transmission Division)
KALAMAZOO, MICHIGAN
Subsidiary EATON Manufacturing Company

Job Talk ...



#### Job-Built Derrick Lifts Big Boilers

A stiff-leg derrick built especially to lift three heavy steel boilers 410 ft to the top of a 29-story office building in Houston, Tex., put on quite an act for gawking sidewalk superintendents when it completed its job like clockwork in less than 2 hr actual hoisting time. Two of the big boilers weighed 75,000 lb; the third weighed 54,000 lb.

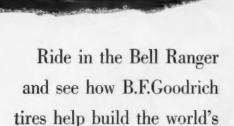
An American crane hoisted to the top of the building by a steel erector's rig and welded at the base to a girder handled erection of the derrick. Boom, mast and legs of the derrick are made of 18-in. steel pipe with a wall thickness of % in. A joint made of telescoping sections of 5-in. and 6-in. steel pipe with a thin sheet of brass in between to serve as a bearing allows the mast and boom assembly to pivot. A 1-ton air tugger provides the muscle for swinging the assembly back and forth. Reach of the 29-ft-long boom is about 17 ft.

The rig weighs about 7,000 lb. An American hoist powered by a 200-hp diesel engine located on the ground works the 6-part lift line consisting of ¾-in. Union wire rope. The four-drum hoist provides a 25,000-lb single line pull. Sam P. Wallace, a mechanical contracting firm of Houston, pulled off the hoisting operation at a cost of \$6,900.

continued on page 24



# Copter hop over the new Niagara



mightiest power project

SOON THE CHURNING WATERS of the Niagara River will be generating more electrical power than ever—over two million kilowatts, enough to light a city the size of Chicago.

More electricity at lower cost is what we'll get from the \$720-million Niagara Power Project, one of the biggest peace-time construction jobs in our history.

Already trucks and other earth-movers have shouldered their loads more than 800,000 times—enough trips to take them ten times around the world.

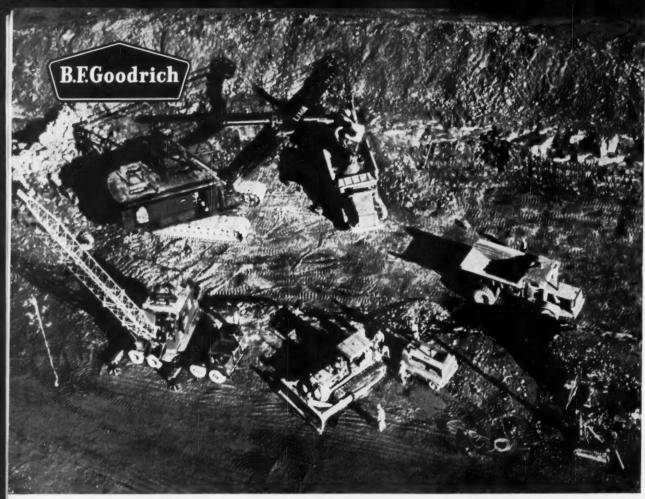
To cope with the challenges of this and other tasks, Merritt-Chapman & Scott Corporation, largest contractor on the project, uses B.F.Goodrich tires and other products.



NOW WE'RE AT 3,000 FEET. Below us is the entire Niagara Project. At the upper right are the Falls. At upper left, 2½ miles above the Falls, is the Intake Area. Here water will be diverted from the Niagara River into 2 giant covered conduits, each of which is as wide as a 4-lane highway and 5 times higher than the Holland Tunnel. These conduits

take the water into the vast Storage Reservoir. From there it moves to the new Niagara Generating Plant, where it plummets down to drive 13 generators. Turn the page and learn how this mammoth job is progressing with the aid of B.F.Goodrich tires.

This B.F.Goodrich report continues



**SWOOPING DOWN** we come over the conduit area that will carry water from the Niagara River to the new reservoir. Excavations for the 46'-wide covered conduits are 110' x 50'. The trucks below us, hauling away rocks, are equipped with

B.F.Goodrich tires. Altogether, more than 2100 B.F.Goodrich tires—on dump trucks, loaders, graders and other equipment—work 'round the clock, six days a week, rolling over rockstrewn Niagara excavation sites.

### See how 2100 B.F.Goodrich tires



B.F.GOODRICH ROCK SERVICE TIRES have run up amazing service records at Niagara—over 5,000 hours in some cases! The new B.F.Goodrich Cut Protected tread compound is outstandingly successful at withstanding cutting and chipping from abrasive Niagara rock. Massive double-chevron Rock Service cleats give extra traction in forward or reverse. And because of the B.F.Goodrich Flex-Rite Nylon cord body, Rock Service tires are almost immune to heat blowouts and flex breaks. Result: you get more original-tread hours of service, more retreadable tires.



TO GIVE CONTRACTORS what they need when they need it, B.F.Goodrich built a warehouse near the Niagara project. A complete line of B.F.Goodrich tires is stored, ready for every emergency. At the B.F.Goodrich Tire Service Building on the job site, a crew of trained tire maintenance men works in shifts, 'round the clock.

IT'S AN EMERGENCY, and the B.F.Goodrich Tire Service Man is there. He's trained to handle any type tire on any type equipment. He has at his disposal all the latest power tools, such as hydraulic cranes, pneumatic wrenches, bead jacks. Background: 13 penstocks at Niagara Generating Plant will direct torrents of water into giant turbines. Penstocks are 462 feet long.



### are helping men harness Niagara

From the beginning of work on the Niagara Power Project, B.F. Goodrich on-the-scene specialists have helped determine exactly the right B.F. Goodrich product for each particular job. In addition to Rock Service tires (now available in the new Cut Protected compound), B.F. Goodrich Rock Logger, Tractor Grader, All-Purpose, Mud-Snow and Power Express tires are at work.

B.F.Goodrich hose feeds air to machines drilling dynamite holes. B.F.Goodrich rain suits, gloves and footwear protect hundreds of construction workers. B.F.Goodrich conveyor belts will carry materials for 1,300,000 cubic yards of concrete, total required for the entire generating plant. And helping to keep the whole project humming are special B.F.Goodrich maintenance and service facilities—all part of the new B.F.Goodrich Unified Contractor Program.

No matter what your off-the-road job, B.F.Goodrich is ready to serve you, and help you save. Your Smileage dealer is listed under Tires in the Yellow Pages of your phone book. The B.F.Goodrich Company, Akron 18, Ohio.

SPECIFY B.F. Goodrich Tubeless or tubetype tires when ordering new equipment.



B.F.Goodrich off-the-road tires

#### HOW TO RUB or GRIND CONCRETE



Today, more and more builders specify a fine finish for concrete walls and ceilings. Because of this new requirement, and of the time and expense involved for hand finishing large areas, Stow Manufacturing Company has developed two easily portable flexible shaft grinders for finishing concrete. These grinders are electrically powered.

Two methods are used to smooth off hardened concrete: wet rubbing and dry grinding. Wet Rubbing — required for smoothing green concrete to a plaster-like finish. Use slow speed grinding wheel or disc. Apply water while grinding. Wet concrete can also be painted on with a brush, then smoothed into holes with the grinding wheel. Dry Grinding — use a high speed grinding wheel or abrasive disc to smooth dry concrete.

Either of Stow's portable, electric grinders, the ½ HP model G40-C or the ¾ HP model JT-50, can be used for wet or dry grinding. Both models are available with open or totally enclosed motors, and are equipped with 8 or 12-ft. flexible shafts. Angle heads with different speed ratios can be selected. Write for STOW's pamphlet, Grinding Concrete, for complete information on proper speeds, grinding discs and wheels for both wet and dry concrete finishing. Stow Manufacturing Co., Binghamton, N. Y. also makes a complete line of concrete vibrators, rotary trowels, and screeds.

Please		your	pamphlet,	GRINDING
Name	* * * * *	 	.Title	
Compa	av .	 		



#### **Dozer with Socket on Blade Pushes Pipe**

A Caterpillar D8 dozer with a circular socket welded to its blade to serve as a push-plate helped install an 8,400-ft natural gas pipeline across the Columbia and Sandy Rivers. Joint venture contractors Hood Construction Co. of Whittier, Calif., and River Construction Co. of Fort Worth, Tex., used a team of big tractors to complete the crossing in time to beat spring floods.

Fabricated on the Oregon shore from 40-ft lengths of 20-in. pipe, seven 1,200-ft sections make up the 8,400-ft crossing. They were walked one at a time to the river's edge by six side-boom tractors. The rigs included an Allis-Chalmers HD-20, three Cat D7's and two D8's.

With two International TD-18's on the Washington side pulling on a cable sling attached to the head end of the pipe and the D8 with the socket welded on its blade pushing on the other end, the pipe sections snaked across the river. Welders added 1,200-ft sections as the pipe placing operation progressed, until the submerged section crossing the river reached its full length. The pipe sections with their protective coating of rock seal and wood laths weighed about 200 lb per ft.

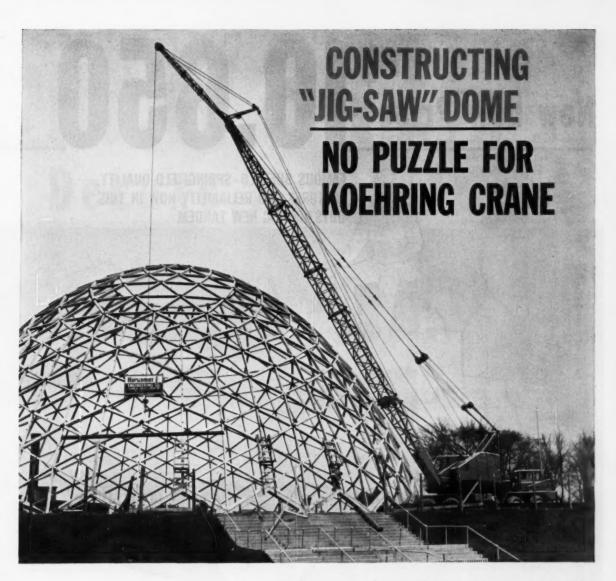


#### Chimney Forms Hang from Hoists

Pouring a 7½-ft lift every day, M. W. Kellogg Co., New York, completed concreting a 450-ft chimney with a 10-man crew in just 4½ months. The stack is for the \$46-million Brunner Island Power Plant now under construction for the Pennsylvania Power & Light Co. at York Haven, Pa.

Chain hoists, hanging from arms that cantilever out from the mast of a derrick like the spokes of an umbrella, supported the steel forms and timber work platforms at the top of the chimney. The contractor jumped the derrick every morning, then pulled up forms for another lift with Wright Safeway hoists. They

continued on page 29



Koehring truck crane with 85-ft. boom and 25-ft. jib handles all erecting of precast forms for unique dome.

A group of unique new landmarks is rising in Milwaukee's Mitchell Park: giant domes of concrete and glass for a modern botanical garden. Milwaukee's Hufschmidt Engineering Company has the task of casting and erecting the concrete hexagons, diamonds and triangles that form the framework for two of these eye-catching structures.

Fast accurate placing of these precast forms - some

of which weigh more than 5000 pounds — calls for a crane with real *precision* control and smooth easy mobility. That's why Hufschmidt uses a Koehring 445... a crane that easily meets all the requirements, speeds completion of the job.

Ask your Koehring distributor for all the facts about Koehring truck cranes . . . they can make money for you, too!

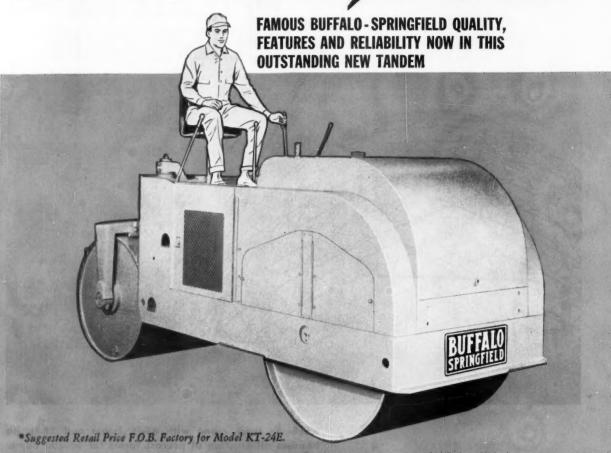
More Work Capacity... More Profit Per Dollar Invested!



OEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin

KAR

# New Low Price 10,650\*



#### **MODELS**

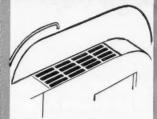
KT - 24 E (8-12) TON

KT - 25 E

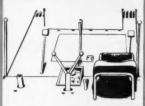
You asked for these new DELUXE Tandem Rollers that combine the job-tested and proved better QUAL-ITY features of the Heavy-Duty Tandem with the ECONOMY of the Standard-Duty model. Now in one great machine you can be sure you'll get more value for every dollar invested than in any roller equipment ever offered before. The cost is slightly higher than some "make-do" rollers on today's market, but each dollar invested in this outstanding Tandem will pay you dividends in lower maintenance, longer life, better performance and top job speed. Talk first to your Buffalo-Springfield distributor. You'll be money ahead!

# DeLuxe Tandem

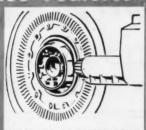
these alue **Features** 



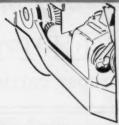
FULL-WORKING VISIBILITY . . Open grille on both sides over drive roll enables operator to see roll edge at all times.



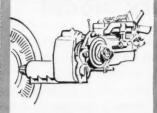
CONVENIENT DUAL CONTROL . . Full operation from either side of machine provides optimum visibility in operation. Speeds up work.



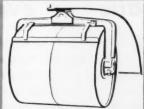
ADJUSTABLE BEVEL GEAR FINAL DRIVE . . Easily adjusted to maintain positive drive at all times. Reduces maintenance costs.



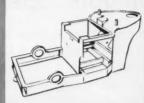
FULLY - ENCLOSED, ARMORED FRAME . . Complete protection for final drive plus high ground clearance for closer rolling.



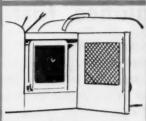
SINGLE-UNIT POWER TRAIN ASSEMBLY. Your assurance of precise alignment of all components for lasting, trouble-free performance.



HYDRAULIC POWER STEERING . Low pressure system permits most accurate control for smooth, close rolling with minimum op-erator fatigue.



RIGID CONSTRUCTION . Maximum strength, longer operating life and greater rigidity to keep you fully satisfied with your new DELUXE.



SIDE AIR INTAKE . . An imper-tant feature that greatly reduces danger of clogging and gives you easier access to radiator.

PLUS... LONG-LIFE TAPERED ROLLER BEAR-INGS so each roller moves smoothly, freely for longer wear, easier action . . SPECIAL MANGANESE ALLOY MACHINED ROLLS for maximum toughness, longest wear . . HIGH-SPEED, LOW-TORQUE REVERS-

ING CLUTCHES for smoothest reversing without grabbing, longest clutch life . . TROUBLE-FREE, RUST-PROOF SPRINKLER SYSTEM uses brass pipes, copper tubing and large capacity tank with filter. SEND FOR FULL INFORMATION.



#### BUFFALO-SPRINGFIELD COMPANY

SPRINGFIELD, OHIO

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A Division of

Company

Please send me your complete data on Models KT24E and KT25E Tandem Rollers

COMPANY ..

STREET\_ CITY\_ STATE. Only **QUICK-WAY**Starts at the Top with
3 BASIC MACHINES\_



# same heavy duty UPPER WORKS in every model in in ev

STEPPED DOWN ratings accomplished by proper carriers, smaller engines...

COUNTER WEIGHT

Always sound

balance, fast smooth operation in every model

"Quick-Way's" 3 FAMILY GROUPS incorporate the latest proven designs and structure so essential in heavy duty truck mounted machines. The structure and design of each model IN ALL 3 GROUPS are so arranged with the proper type and size carriers that balance and low center of gravity is individually engineered into each separate unit. With the exception of carriers, engines, counterweights and variations in application of single or tandem hook rollers, with or without anti-friction bearings, all models in each family group have the same heavy duty UPPER-WORKS as used in the highest rated capacity of the group. As a result there is a "Quick-Way" with a capacity rating to FIT YOUR JOB and YOUR BUDGET.



were ready to concrete the next lift that afternoon.

The chimney tapers from a diameter of 36 ft at the base to 24 ft at the top. It took a total of 1,600 yd of concrete to top it out.



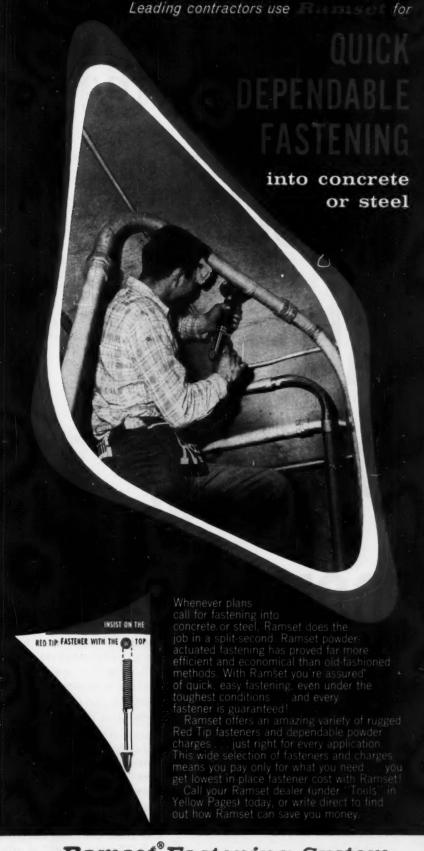
#### Tongs Grip Tight, Extract Sheetpiling

Tongs used to pull 60-ft-long sheetpiling driven deep into the bed of the Ohio River save time and money for Dravo Corp. of Pittsburgh in construction of New Cumberland Dam at Stratton, Ohio.

The tongs are used with a conventional pile extractor. But normally, extraction involves the time-consuming and occasionally hazardous job of running a clevis pin through a hole in the pile to connect the extractor. The tongs do away with this manual step altogether, gripping the pile firmly with a wedge action that tightens automatically as resistance to extraction increases. There is no need for a workman to stand by to make adjustments.

Lowered into position with its jaws locked open, the tongs fit readily over the web of a piling section. Maximum opening of the jaws is 1¼ in.; minimum opening is ¼ in. When the operator lets a little slack into the line holding the extractor and tongs a latch disengages from its retaining pin and closes the jaws. Shaped to present a maximum bearing surface, the jaws have 10 teeth to insure positive gripping.

Designed by the Materials Handling Division of the Heppenstall Co., New Brighton, Pa., the tongs are made in both 30-ton and 50-ton capacities. A bracket to connect the tongs to a pile extractor is furnished with each pair.

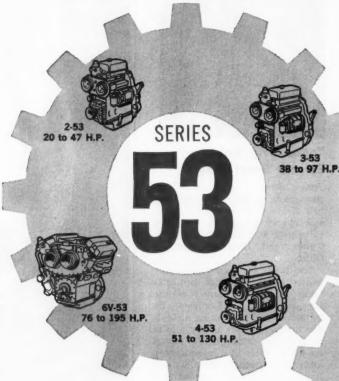


Ramset Fastening System
Olin Mathieson - Winchester-Western Div. - 281-F WINCHESTER AVE. - NEW NAVEN 4, CONN.

# GM sets the standard for with a family

ALL-PURPOSE

POWER LINE



"A family of engines geared to every job." The farsighted engineering design which has made this statement a reality enables you to get all the savings built into the family of Series 53\*, 71\* and 110\* engines. Yet you can still buy or specify your exact engine requirement.

You get engines tailored in power, size and weight to your exact needs—20 to 1650 H.P. in only three cylinder sizes.

Because of wide interchangeability of parts within the family, replacement parts cost less. You can protect new engines with current parts inventories. You can also meet changing horse-power needs and still keep the benefits of present operating know-how, maintenance training and existing parts inventories.

Wherever you use engines, you'll find Series 53\*, 71\* and 110\* GM Diesels will raise your productivity—and profits. Your GM Diesel distributor can prove it—he's in the Yellow Pages under "Engines, Diesel," or write us direct.

\*Refers to cubic inches displacement per cylinder.

# DIESEL PRODUCTIVITY

of engines geared to every job

CHOOSE FROM THREE SERIES...20 TO 1650 H.P....ONLY THREE CYLINDER SIZES





## Lima Roadpacker gets smooth response from 3 Twin Disc Oil-Actuated Clutches

The Lima Roadpacker has dispelled the idea that high-density compaction has to be a snail-paced operation. This agile unit has a compacting speed range of 20 to 95 fpm and shifts instantly for fast travel (up to 30 mph) from job to job or around a job site. It compacts with equal precision in forward or reverse. Six heavy shoes, each producing 2200 vertical vibrations per minute, fill all voids from bottom up without shoving action.

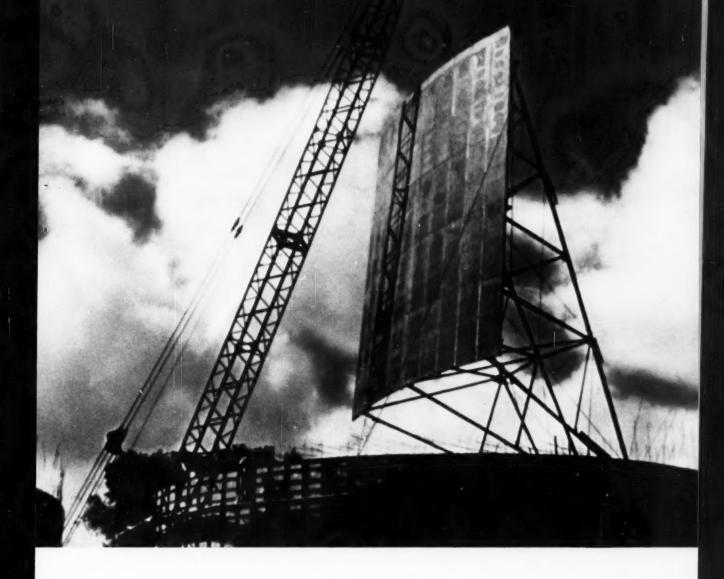
The Roadpacker's mobility is due in large part to three 5" Twin Disc DOC Clutches. The first of these oil-actuated multiple-plate clutches drives the main vibrator pump. Another engages the hydraulic propelling mechanism for compacting range operation. The third is used in highway travel range.

Built to run in oil, Twin Disc DOC Clutches are compact in size, smooth and trouble-free in performance. They never need adjustment because ram travel increases automatically as the plates wear down.

The oil-actuated clutch used in the Lima Roadpacker is one of a complete line of friction and fluid drives built by Twin Disc. You'll find these performance-proven drive components on virtually every make of construction equipment.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division: Rockford, Illinois





4 Ton Ganged Section, 22 Ft. by 28 Ft. Used for . . .

#### 28' High Circular Walls of Sewage Plant

Friebel & Hartman, Shelby, Ohio contractor, was able to strip and reset 2,300 square feet of forms on the inside gang section in  $3\frac{1}{2}$  hours. A  $\frac{3}{4}$  yard crane with an 80' boom handled the sections. 8 men in less than 8 hours erected 2,300 square feet of forms and scaffolding on the outside, plus pouring the concrete. The project was the Mansfield, Ohio Sewage Treatment Plant, which consisted of four digestors, each 80 feet in diameter, 28 feet in height and 8 inches thick with no horizontal joints.

Four ganged sections were used—each 22 feet wide and 28 feet high. This allowed pouring  $\frac{1}{3}$  of a tank at a time, and a pour every four working days.

Weight of each ganged form section was about four tons. By using three trusses to brace each ganged section contractor was able to hold bracing costs to a minimum.

Complete story on the Ohio Sewage Treatment Plant will be sent *free* upon request. Symons Steel-Ply Forms can be rented with purchase option.



4249 Diversey Avenue Dept. IN Chicago 39, Illinois

Warehouses Throughout the U.S.A.



FOR ALL 3 PROJECTS:

Mason Contractor: Axel H. Ohman, Inc. Dealer: Wunder Klein Donohue Co. both of Minneapolis, Minn.

U. S. Department of Interior, Bureau of Mines Building, Minneapolis, Minn.

Architect: Bettenburg, Townsen, Stolte & Comb, St. Paul, Minn.

Contractor: Maurice Mandel, Inc., Minneapolis, Minn.

## LEHIGH MORTAR CEMENT

"... meets our requirements to the utmost"

Lyndale Housing Project Min.

Lyndale Homes Housing Project, Minneapolis, Minn.

Owner: City of Minneapolis

Architect: Thorshov & Cerney, Inc., Minneapolis, Minn.

Contractor: Johnson, Drake & Piper, Inc., Minneapolis, Minn.

• Eight years ago mason contractor Axel Ohman reported that . . . "The economy and workability of Lehigh Mortar Cement convinces us that it meets our requirements to the utmost. It has good bonding qualities along with absence of shrinkage. We are not alone in this opinion as owners, architects and inspectors have also made favorable comments."

That Mr. Ohman still prefers Lehigh Mortar Cement is proved by its use in the three recently completed quality masonry projects pictured here.

Whether a job is big or small, modern or traditional, Lehigh Mortar Cement can help you build strong, weathertight masonry walls. Lehigh Portland Cement Company, Allentown, Pa.





Southdale Medical Building, Edina, Minn. Owner: Southdale Management, Inc. Architect: Victor Gruen & Associates, Los Angeles, Calif. Contractor: C. F. Haglin Construction Co., Minneapolis, Minn.

LEHIGH MORTAR CEMENT . LEHIGH EARLY STRENGTH CEMENT . LEHIGH PORTLAND CEMENT . LEHIGH AIR-ENTRAINING CEMENT

# 2 NEW TRAXCAVATORS BY CATERPILLAR

SHIFT TRANSMISSION

AND LIVE ACTION HYDRAULICS

977 Series H · 955 Series H

...all new for new high production

## FASTER loads...lifts...hauls...



00 ---

READY TO GO. With the range selector in low, the operator has only to use the power shift lever for split-second changes of speed and direction. Between the range selector and the power shift lever, the new 977H has 4 speeds forward and 4 faster in reverse. However, for the average job, only the power shift becomes the operating lever. Automatic tilt control has positioned the 2½ cu. yd. bucket for digging.





4.2 sec.

FASTER LOADING. With 150 HP at the flywheel and an operating weight of 36,270 lb., the 977H develops up to 72,000 lb. push at converter stall without stalling the engine—push aplenty to break out big loads. Live Action Hydraulics deliver increased digging power to operate the bucket with greater speed and force for faster loads. The material here is an earth and gravel mixture, up to one inch in size.

#### **New Cat Series H Traxcavators!**

There is a way to beat higher costs—and that's with increased production. For tractor-loader jobs, here's your answer in the new Caterpillar 977H and 955H Traxcavators. Designed to set a production pace far faster than the models they replace and any other tractor-loaders of comparable size, they're milestones in tractor-loader progress. With Cat power shift transmission and Live Action Hydraulics, they're machines that never stop. Look at the action pictures here and you'll see why. That's the 150 HP 977H with its 2½ cu. yd. bucket working. The 100 HP 955H with its 134 cu. yd. bucket is equally spectacular. Listed here are some of the features that make these machines the fastest working tractor-loaders ever built. For complete details, see your Caterpillar Dealer.





13.2 sec.

FASTER HAULING. Using a light touch on the power shift lever to reverse instantly and pick up haul speeds, the operator returns at 4.0 average MPH over a total distance of 48 feet to the truck. Because the new 977H is heavier than the previous model and its center of gravity is 10% further to the rear, it has greater stability to handle with ease the heavier loads in the new 2½ cu. yd. bucket.

# dumps ... cycles!





18.0 sec.

FASTER DUMPING. The 977's bucket reach of 39½" at 9' 4" dump height easily clears this 7' 8" high, 10 cu. yd. truck. With this reach, the operator can cast the load where he wants it without time-wasting jockeying. Automatic kick out on the lift controls further reduces bucket maneuvering time. Dumping completed, the operator moves the power shift lever for instant return toward another load.





26.4 sec.

FASTER RETURN. With a return time of 8.4 sec., the total cycle time for the 977 was 26.4 sec. In a typical job study, the average cycle time per truck load was 117.6 sec. In 60 minutes the 977H loaded 30.6 trucks with a total of 306 cu. yd. This is typical of the outstanding performance you can expect from the 977H —

and, in its capacity, from the 955H. Nothing in their size range can match the Traxcavators that never stop for fast cycles and high production!

#### **NEW POWER SHIFT TRANSMISSION**



One lever—that's right, one lever gives split-second changes in speed or direction to slash cycle times and increase operator efficiency. This Caterpillar exclusive was designed especially for the 977H and the 955H.

#### NEW LIVE ACTION HYDRAULICS



Another Caterpillar first. Live Action Hydraulics provide faster lifting speed and greater lifting capacity without robbing power from the tracks. The 977H packs 41% more hydraulic lifting power—955H, 23% more than former models.

#### MORE HORSEPOWER WITH NEW CAT TURBOCHARGED ENGINES

Up 50% on the 977H—its new Cat D333 Engine develops 150 HP at the flywheel. Up 43% on the 955H with a new Cat D330 Engine that develops 100 flywheel HP.

#### NEW INCREASED BUCKET CAPACITY

An 11% increase on the 977H with new 2½-cu.-yd. bucket —and a 16.6% increase on the 955H with new 1¾-cu.-yd. bucket. To handle the heavier loads, bucket linkage on both machines has been strengthened.

#### **NEW HEAVY-DUTY UNDERCARRIAGE**

Built to stand up under the toughest jobs, the new undercarriage on both machines features larger, stronger track components that also increase stability...lifetime lubricated rollers that need no lubrication until rebuilding...and track guiding guards welded to the roller frame for positive track alignment. The 955H also features a new 6-roller track frame.

#### FAST TRAVEL SPEEDS

	9	77H.	For	ward			955	H F	orwa	rd	
	Low			High	1		Low			High	
2.	MPH	1st	2.5	MPH	1st	2.1	MPH	1st	2.7	MPH	1st
3.	MPH	2nd	4.7	MPH	2nd	3.9	MPH	2nd	4.9	MPH	2nd
				Rev	erse	speeds	25%	faster	than	forw	rard

#### MORE HIGH PRODUCTION FEATURES

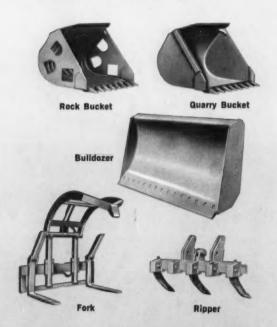
Other features on both machines include a new, twocylinder high-speed gasoline starting engine for positive starts in any weather...and a new, dry-type air cleaner that removes 99.8% of all dirt from intake air even in the worst dust conditions, cuts maintenance time as much as 75%. Retained features include 40° bucket tilt back...automatic bucket positioners and kick out... 3-grouser track shoes...and quick-change attachments that multiply the machines' usefulness.

# PACE-SETTING POWER PLUS VERSATILITY

#### in the new Cat Series H Traxcavators



SIDE DUMP BUCKET Directly interchangeable with the standard bucket, the side dump bucket provides increased versatility for Series H Traxcavators. It eliminates turning and requires less loading space — to sum up, lowers cycle times for even greater production. Capacities: 977H—2% cu. yd.; 955H—1¾ cu. yd.



You've seen how increased horsepower, power shift transmission and Live Action Hydraulics make the new 977 and 955 Series H Traxcavators the fastest working tractor-loaders in the field. That means higher production for you not just on one job application, but on many—because of the many attachments available with both machines. Bar none, Traxcavators are the most useful machines you can own. With attachments, you can always keep them working—and working profitably.

Have you checked your equipment line-up recently? There may be machines in it that are no longer paying their way—or not earning all the profits they should in light of today's more efficient units. A comparison of your existing tractor-loaders with the new Series H Traxcavators might easily prove these new machines would increase your output and profits far more than you imagine.

Get the down-to-earth facts about the new Series H Traxcavators from your Caterpillar Dealer. Better still, ask for a demonstration. See for yourself how they set a new production pace on the toughest kind of job!

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

#### CATERPILLAR







In the market for carriage bolts?

We make a full line of sizes.

Lag, and machine bolts also.

And they're all top quality.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributors Bethlehem Steel Export Corporation.

BETHLEHEM

FOR RESULTS LIKE THIS ON YOUR NEXT SHOT ...

# WHICH EXPLOSIVE?

The Penn-Can Highway near New Milford, Penna., connecting the Pennsylvania Turnpike Northeast Extension with the New York Thruway. Contractors: D. A. Kessler Construction Company, Mt. Carmel, Penna. and Lycoming Construction Company, Williamsport, Pennsylvania.



Here's really-effective blasting, the kind that gets more payload service out of all your equipment. Look at the breakage...it is uniform and thorough. The rock is "fluffed up" into high peaks that will roll it towards the shovel. Such blasting bottoms well too, with no high spots or boomstraining undisplaced rock under the pile.

Which Explosive? In this case, Atlas AN with Giant "75" primers and Rockmaster® millisecond delay caps initiated at the bottom of 6-in. holes was the right combination for the job.

The point is, breakage, displacement and control like this don't just happen. There is a combination of explosives and blasting methods that is right for every shot. Helping you find the right combination and putting it to work is the job of

your Atlas Representative. Working with him, you'll have the advantage of his experience with the latest advances in explosives and techniques. Backed by the complete Atlas line, he can help you determine the explosives combination and the particular blasting methods that will be the most profitable for you on every shot.

There is only one way to look at explosives costs, and that is: which explosive will give you the most payload service from all your equipment? Our blasting cost chart, slide rules and technical literature are designed to help you do exactly that. Ask your Atlas Representative about them . . . or, write directly to:

ATLAS POWDER COMPANY Explosives Division, Wilmington 99, Del.

# TLAS EXPLOSIVES

When you use the right combination, all your equipment moves in sooner... works faster... produces more.

と言うという。



ATLAS PELLETS, a new form of ammonium nitrate, have both the density and sensitivity required for efficient ammonium nitrate blasting.



GIANT "75" PRIMERS have the wallop required for complete, efficient detonation of both field mixed and plant mixed blasting agents.



GIANT GELATINS are for high velocity shattering action. They are advantageous for extremes of wet work and for hard, tight shooting.



ROCKMASTER® electric blasting caps achieve the staggered action which has been so important in producing better breakage and control.

MODEL 360T setting steel for chemical plant in Texas. UNIT 360T truck cranes have lifting capacities ranging up to 40 tons. Whatever your lifting or digging job...



UNIT 513T CHALLENGER, carrying 1/2-yd, bucket, pouring concrete for new school in Florida. The CHALLENGER is a 1/2-yd, excavator.



UNIT 1014 truck-mounted \(^4\)eyd, dragline widening and deepening creek bed in Texas. As a crane the Model 1014 is rated at 15 tons.



UNIT 1520T trench hoe digging ditch for sewer line in California, A %-yd. excavator, the 1520T truck crane is rated at 20 tons.



#### You are looking at

# 5 BIG REASONS why UNIT Truck Cranes give you

#### **More Earning Power**



#### 1. POSITIVE CONTROL FRICTIONS.

All operating clutches on a UNIT are disc type. Engaging pressure is uniformly distributed...loads are picked up smoothly and evenly without grabbing.



#### 2. DIRECT IN-LINE ENGINE MOUNTING.

Engine, torque converter, and worm drive are all mounted straight-in-line with main machinery. You get ample power for heavy lifts or heaping loads . . . greater operating efficiency.



#### 3. BALANCED WEIGHT DISTRIBUTION.

Load rollers at front and rear of turntable support weight of upper structure . . . absorb tipping strains. There is no rocking under heavy loads. Upward thrust is absorbed by self-aligning hook shoes. Large turntable gear and roller path have ample strength to accommodate maximum loads at long radii.



Originated by UNIT and then adopted by others, this cab provides full 360° visibility in all directions to assure efficient and safe operation.



#### 5. INDEPENDENT BOOM HOIST.

Worm type boom hoist permits power raising and controlled lowering of boom at high speeds. Equipped with safety brake, boom hoist is operated by disc clutches and is entirely independent of any other operation.

UNIT TRUCK CRANES are built in five size ranges — 10, 15, 20, 30, and 35-40 tons — and (except for Model 360T) are fully convertible. Your UNIT dealer has full information on every model — and on the famous UNIT crawler-mounted machines, too. Call him soon.

SHOVELS

HOES

CRANES

1/2 to 3/4 YDS.

1/2 to 3/4 YDS.

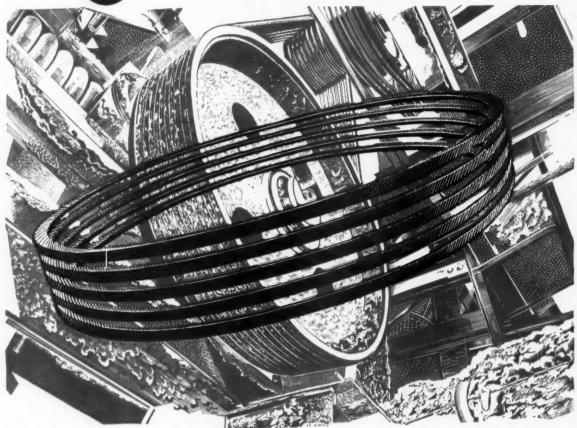
5 to 40 TONS

UNIT CRANL, HOVEL CORP.

6305 W. Burnham Street Milwaukee 19, Wisconsin DRAGLINES

1/2 to 3/4 YDS.





#### "Swinging Loads" demonstrate how

# balanced driving power pays off

The flywheels on stone-crushing machinery at the Bethayres Concrete Products Company in Bethayres, Pa., put V-belts under a "tremendous strain."

Not only must each set of 8 U.S. Royal V-Belts driving the flywheel operate under extremes of abrasive conditions, it must also operate on constantly changing centers. As incompressible foreign matter enters the driven rollers, they swing or oscillate to allow passage. The result is constantly changing tensions under pressures amounting to many tons!

Yet even with this constant change in tensions and the severity of the abrasive conditions, the U. S. Royal V-Belts continue to share the load for an average of one year of rock-breaking service.

The C-210's used on these V-sheave to flat-surface drives,

like all of the approximately 250 "U.S." belts in 48 different sizes used throughout the Bethayres plant, have a built-in advantage. "Balanced driving power"... the result of specially developed manufacturing equipment that automatically controls weight, dimensions, density, length, and tension members... helps provide a uniformity, toughness, length stability and true-running smoothness that have paid off in job after job, plant after plant the nation over.

Put balanced driving power to work in your own operations. See your "U. S." Power Transmission Distributor for full stocks and expert service.

U. S. Royal V-Belts and engineering assistance for these drives supplied by "U. S." Distributor Lindsay-Oberholzer of Philadelphia, Pa.



Mechanical Goods Division

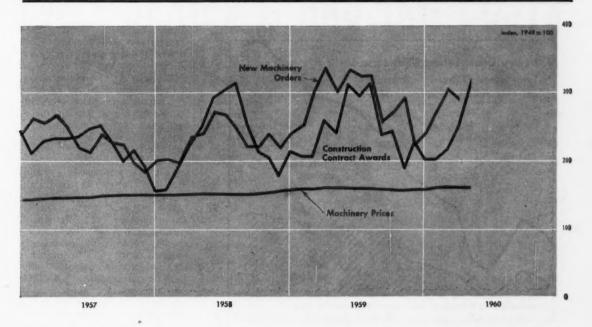
#### United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y.

In Canada: Dominion Rubber Company, Ltd.

#### Trends in the Machinery Market ...



#### **Price Index**

	APRIL	MONTH	YEAR	CHANGE
	1960	AGO	AGO	1959-198
All Types of Equipment	174.7	174.3	172.0	+ 1.5
Cranes; Draglines, Shovels	172.5	172.1	169.2	+ 1.9
Shovel, 1/2 cu yd	175.7	167.7 174.7	157.8 172.5	+ 1.8
Shovel, ¾ cu yd	100 6	187.0	184.6	+ 2.1
Shovel, 1-1½ cu yd Shovel, 2-2½ cu yd		166.4	162.1	+ 2.6
Shovel, 3-31/2 cu yd	167.9	167.8	167.8	0
Shovel, 6 cu yd	195.0	195.0	188.2	+ 3.6
Crane, truck mounted	168.2	168.2	169.6	- 0.9
Crane, tractor mounted	135.1	135.1	135.1	0
Bucket, clam shell		162.9	157.5	+ 3.4
Bucket, dragline	169.3	169.3	169.3	0
Scrapers and Graders	166.2	165.8	165.7	+ 0.3
Scraper, 4 Wheel, 8-10.5 cu yd	155.0	155.0	155.0	0
Scraper, 4 Wheel, 12-15 cu yd	156.8	156.8	156.8	. 0
Scraper, 2 Wheel, 15-19.5 cu yd (a)	126.2	124.9 172.6	123.7 172.6	+ 2.0
Grader, heavy duty Grader, light & medium	173.1	171.1	171.1	0
Tractors (non-farm, incl industrial)		190.7	187.8	+ 1.8
Wheel type, off-highway (a) Crawler type, 50-74 dhp	129.2	129.0 197.2	128.2 191.9	+ 0.7
75-99 dhp	201.2	201.2	196.4	+ 2.4
100-154 dhp		192.4	191.3	+ 1.5
155-200 dhp		203.3	201.3	+ 0.9
Machinery, Tractor Mounted	169.2	169.0	168.6	+ 0.3
Dozer, cable controlled	154.4	154.4	154.4	0
Dozer, hydraulic controlled	186.6	186.6	186.6	0
Cable power control unit		151.4	151.4	+ 0.9
Loader, tractor shovel		162.5	161.5	+ 0.6
Specialized Machinery	157.8	157.7	154.5	+ 2.1
Ditcher	150.2	150.2	156.6	- 4.1
Roller, tandem	226.4	226.4	206.1	+ 9.8
Roller, 3 wheel	178.7	178.7	170.2	+ 4.9
Ripper and rooter Dewatering pump, 10 M gph	130.0	150.5 111.5	150.5	+ 4.0
Dowetering pump, 10 M gph	161.5	151.5	110.0 148.6	+ 1.3 + 1.9
Dewatering pump, 90 M gph				,
Portable Air Compressors		167.5	167.5	0
Contractor's Air Tools		181.6	181.6	0
Mixers, Pavers, Spreaders		159.3* 166.8	155.8	+ 2.5
Mixer, portable 11 cu ft Mixer, portable, 16 cu ft	172.7	172.7	164.1 168.6	+ 1.6
Mixer, truck. 6 cu yd	132.1	135.1	131.1	+ 3.0
Mixer, paving, 34 cu ft	196.7	193.5	191.6	+ 2.6
Concrete finisher & spreader	201.9	199.7	191.5	+ 5.4
Bituminous distributor	126.2	126.2	122.3	+ 3.1
Bituminous spreader		170.2	170.2	0
Bituminous paver		163.2	162.6	+ 0.3
Off-Highway Trucks, Wagons (b)		101.1	101.1	- 0.1
Contractors off-highway truck (b)		101.1	101.1	- 0.8
Trailer dump wagon (b)	106.7	101.4	101.4	+ 5.2
		10.0		

● (a) January 1955=100 • (b) January, 1958=100 \*Revised BLS Primary Market Price Indexes, U. S. Department of Labor, 1947-49=100

# Contracts Boom; New Orders Hold High

The 1960 upswing in heavy construction contractors' new business speeded from a trot to a sprint in the month of April. Contracts zoomed to the second highest month ever recorded by Construction Methods. The Contract Awards Index soared to 320, based on 1949 dollar volume as 100 (see chart).

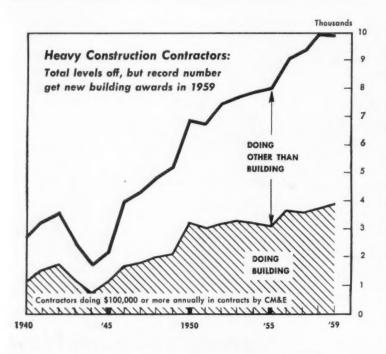
Burgeoning awards confirmed the expectations of contractors who ordered a record dollars' worth of new equipment in the first two months of the year. And though orders in March slipped 13% below the March record set in 1959, they came close to the high January-February rate, according to the McGraw-Hill Economics Department's New Orders Index for construction and mining machines.

The March Orders Index of 294, based on 1949=100, remained well above the Contract Awards Index. And the first quarter average for the Orders Index came within 1.3% of last year's record, while the Contract Awards Index was a slight 1% above the first quarter of '59.

But the rapid acceleration in the flow of contractors' new business in April expanded 1960's lead over '59 to 9%. This indicates that heavy ordering should continue in the second quarter.

Manufacturers have forecast that the New Orders Index will climb to a monthly average of 311 for the April-June quarter (Construction Methods, Mar. '60, p. 45). This would be a 6% increase over the first quarter's average. But equipment makers have evidently been over-concerned about the slower-than-expected flow of contractors' new business in the first quarter. Their new forecast for the second quarter is down 7% from the earlier prediction of 333 made in February.

#### Construction Business...



# Record Number of Builders Do \$100,000 or More

A RECORD 3,936 building contractors took on \$100,000 or more in new building contracts reported by Construction Methods in 1959. But a 5% decline in contractors doing \$100,000 or more in construction other than building brought the total count of heavy construction contractors in the \$100,000-Up bracket down a slight 1% below 1958's record to 9,984 in '59.

Last year's increase in building contractors mirrored the sharp rebound in industrial building, a big gain in mass housing (developments and apartments costing \$400,000 or more) and a record volume of commercial building contracts. The number of contractors winning new shopping center or store construction jobs jumped 43%, thus accounting for all of the '59 increase in firms taking on commercial building. By contrast, fewer contractors had new private office building awards last year, compared to '58. (See table)

The cutback in federal-aid highway and bridge contracting during the second half of '59 is mainly responsible for the 5% dip to 6,048 contractors taking on \$100,000 or more in other-than-

#### 9,984 Heavy Construction Contractors Had \$100,000 or More in New 1959 Contracts

Number taking on \$100,000 or more per year in contracts reported by Construction Methods.

		Contra ing \$100 or mor	0,000		ractors 0,000 or			ractors			ractors ,000-\$50	
TYPE OF WORK	1959	1958	Change '58-'59 %	1959	1958	Change '58-'59 %	1959	1958	Change '58-'59 %	1959	1958	Change '58-'59 %
Total	9,984	10,052	- 1	3,489	3.559	- 2	2.029	2.046	- 1	4,466	4,447	+ 0.4
OTHER THAN BUILDING Waterworks	6,048 678 1,190 811 2,805 765 914 857 1,420	6,388 587 1,136 1,122 3,151 685 1,044 1,022 1,637	- 5 + 16 + 5 - 28 - 11 + 12 - 12 - 16 - 13	1,776 246 357 394 1,032 370 429 290 603	2,053 190 377 653 1,289 350 473 379 666	-13 +29 -5 -40 -20 +6 -9 -23	1,104 130 237 148 536 124 145 122 246	1,174 109 202 169 631 102 165 147 248	- 6 + 19 + 17 - 12 - 15 + 22 - 12 - 17	3,168 302 596 269 1,235 271 370 445 571	3,161 288 557 300 1,231 233 406 496 723	+ 0.2 + 5 + 7 -10 + 0.3 +16 -16 -10
BUILDING	3,936 1,481	3,664 1,050	+ 7 +41	1,713	1,506 446	+14+38	925 207	872 174	+ 6 + 19	1,298	1,286 430	+ 1 + 53
And public	2,990 907 995 189 99 275	3,057 514 1,143 228 116 192	- 2 +76 -13 -17 -15 +43	1.535 507 558 149 56 187	1,385 126 565 148 79 110	+11 +302 1 + 1 29 +70	237 290 30 26 55	791 195 309 47 18 49	+ 3 +22 - 6 -36 +44 +12	644 163 147 10 17 33	881 193 269 33 19 33	-27 -12 -45 -70 -11
and atomic energy Other building: private Other building: public Federal (included above)	243 457 353 370	353 460 272 478	-31 - 1 +30 -23	102 280 204 223	134 257 157 294	-24 + 9 + 30 24	40 89 78 62	59 100 56 58	-32 -11 +39 + 7	101 88 71 85	160 103 59 126	-37 -15 +20 -33

Comparison study of Cat DW21G Tractor with SynchroTouch Transmission Control shows

# DW21 SERIES G HAULING COSTS ...32% lower than Tractor X ...16% lower than DW21 Series C

Results on the job are the only true measure of a machine's ability to produce *profitably*. Competing on an actual job under identical conditions against Tractor X and a DW21 Series C, the new Caterpillar DW21 Series G-470B team hauled dirt at lowest cost per cu. yd. The combination of SynchroTouch Transmission Control on the tractor and LOWBOWL design of the scraper is unbeatable—note the results below. Your Caterpillar Dealer has a complete report on this job as well as other revealing time-and-cost studies. Ask him to show them to you. See for yourself how the DW21G-470B can step up your profits! Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

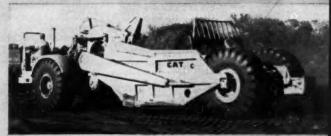
PROJECT: South End Shopping Center, Tukwila, Wash. PURPOSE OF STUDY: To compare production and cost per yard of equipment observed. EQUIPMENT: One DW21G with SynchroTouch Transmission Control; two Tractor X (24-yd. struck, plus 36-inch sideboards); and three DW21C (18 yd. struck). JOB CONDITIONS: Material — slightly damp clay with some sand. Density—3425 lb./bank cu. yd., average of three tests, oil method. Haul length—1300 ft. (one way), return same route. Haul road conditions—soft, not maintained during study. Weight test—loads weighed with Streeter-Amet Electronic Scales. Pusher—all units pushloaded by D9 with Torque Converter Drive.

JOB DATA:		Cat DW21G w/SynchreTeuch	Cat DW21C	Tractor X
Average Load Time .		.73	.75	1.20
Average Haul, Dump and Return Time .		4.14	4.67	4.25
Average Wait Time .		.44	.44	.44
Average Cycle Time .		5.31	5.86	5.89
Average Payload in Bank Yards		20.0	17.5	23.9
Trips per Hour		11.3	10.0	10.0
Average Hourly Prod. (bank cu. yd.)		226	175	239
Owning and Operating Costs per Hour* .		\$20.37	\$18.87	\$31.84
Cost per Yard		9¢	10.8¢	13.3¢

\*Healing costs only - does not include pusher costs



FIELD ENGINEERS WEIGHED LOAD AFTER LOAD as the competing units passed over the portable Streeter-Amet Electronic Scale. By subtracting average empty weight from average gross weight, they determined the average net load weight. This and other job studies prove that the new DW21G-470B hauls dirt at lowest cost per cu. yd., regardless of capacity of competing scrapers.



NEW CAT DW21G TRACTOR-470B LOWBOWL SCRAPER. New Turbocharged 345 HP Cat Engine delivers 12% higher rimpull giving up to 20% faster travel speeds under similar haul conditions than the previous model. With SynchroTouch Transmission Control (optional), operator simply dials desired gear for automatic, split-second, touch-and-go response. New 470B LOWBOWL Scraper is rated at 19.5 cu. yd. struck; 27 cu. yd. heaped. LOWBOWL design loads more material faster because of less loading resistance. Result: DW21G-470B moves dirt at lowest cost per cu. yd.

#### CATERPILLAR

HAUL AT LOW COST PER CU. YD. WITH A DW21G-470B Specify FULLER..

Designed

High capacity

MODELS OF

- Widest range of ratios
- Low initial cost, less maintenance

- Optional topmounted power take-off
- Available from all leading truck manufacturers on specification



### Specify the MODEL

AUXILIARY TRANSMISSIONS

for YOUR job!

For MEDIUM-HEAVY DUTY, specify the Fuller 65 Series 3-speed Auxiliary

#### **65 Series: Ratios**

	SPLITTER	RATIOS	DEEP
MODEL	High	Inter- mediate	Low
3-A-65	.754	1.00	2.221
3-B-65	.804	1.00	1.239
3-C-65	.754	1.00	1.239
3-D-65	.804	1.00	2.221
3-E-65	.804	1.00	1.74
3-F-65	.754	1.00	1.74
3-G-65	1.00	1.32	2.221
3-H-65	1.00	1.32	1.74

For HEAVY DUTY, spe Fuller 92 Series 3-speed Auxili

	SPLITTER	RATIOS	REDUCTION		
MODEL	High	inter- mediate	Love		
3-A-92	.74	1.00	2.09		
3-B-92	.84	1.00	1.24		
3-C-92	.75	1.00	2,64		
3-D-92	.75	1.00	1.24		
3-E-92	.84	1.00	2.09		
3-F-92	.84	1.00	2.64		
3-G-92	1.00	1.327	2.09		
3-H-92	1.00	1.327	2.64		

P. S. Fuller also offers three heavy-duty 3-speed Auxiliaries with built-in high-torque power take-off. Ask your dealer about the Fuller 3-T-92 Series Auxiliaries.

TRANSMISSION DIVISION -MANUFACTURING COMPANY



Subsidiary EATON Manufacturing Company

Unit Drop Forge Div., Milwaukee 1, Wis. \* Shuler Axle Co., Louisville, Ky. (Subsidiary) \* Sales & Service, All Products, West. Dist. Branch, Oakland &, Cal. and Southwest Dist. Office, Tulsa 3, Okly, Automotive Products Company, Ltd., Automotive House, Great Portland Street, Landon W.1, England, European Regresentative

#### THE WORLD'S MIGHTIEST MOTOR GRADER

A Valuable
Tool for
Modern
Highway
Construction



GALION'S T-700 Grade-O-Matic Motor Grader is a powerful giant with versatile capabilities and tough "muscles" that do precision work or the roughest and heaviest work

GALION

 The gigantic 14' x 30" x 1" hydraulic shiftable moldboard moves the biggest and heaviest windrow of any grader. Maximum reach outside rear tires is 109".

with the ease of a trained athlete.

This champion of motor graders—with 220 horsepower balanced to 42,000 lbs. of weight—answers the need for new records for fast work cycles, deep cuts, most blade capacity, maximum push power at the blade, and incomparable handling ease.

The most notable advancement in motor grader operation is in the AUTOMATIC features designed into the Galion T-700—automatic multiplication of torque, automatic application of power, and automatic regulation of working speed.

There is no tiresome clutch operation because there is no foot clutch. A power-shift transmission does the hard work. Engine stalling and lugging are eliminated.

Ruggedness of construction is evidenced in the 6" square solid steel drawbar, the box-type frame which weighs 160 lbs. per foot, the circle weight of 54 lbs. per foot, and the size of the tapered front wheel spindles which are 3\(^2\)/4" and 2\(^1\)/2" diam-

eter at the bearings. Unequaled front end stability is provided by the 16.00 x 24, 12-ply tires.

The most recent advancements in engineering and design are employed to give the utmost in dependability and ruggedness—the last word in combination manual with power booster steering; efficiency in the circle reverse; thick, heavy, rugged gear case; and the most secure attachment of drive wheels to stub axles ever devised.

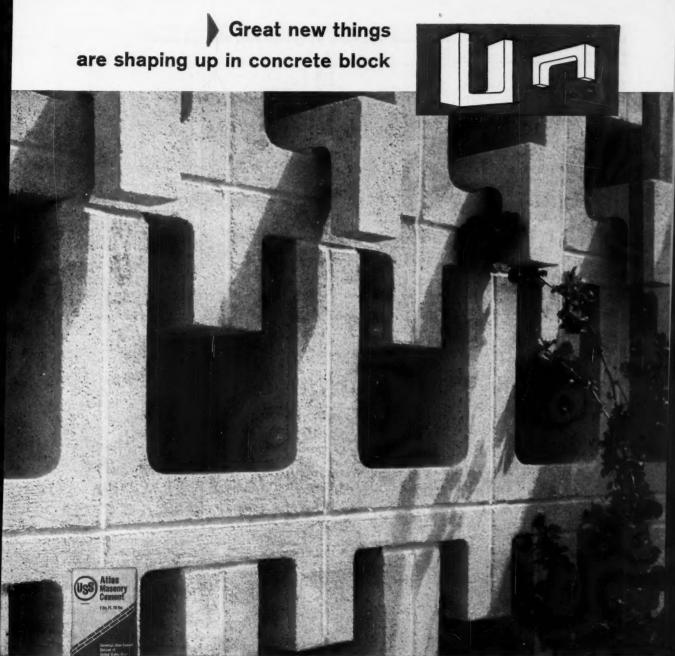
Work records all over the country have proved this super grader has unmatched work capacity—the kind that's needed on the mammoth Federal highway construction program. The usual enthusiastic comment of contractors who are using the T-700 is that it does more than twice as much work as any other grader they have ever used.

For further information write The Galion Iron Works & Mfg. Company, Galion, Ohio, or any of their distributors.





The torque converter drive, power-shift transmission, tail-shaft governor, and decelerator utilize with utmost efficiency the 220 hp from the Cummins diesel engine. The tremendous weight and power of the Galion T-700 is especially effective on bank-cutting work.



#### For information on bond beam block, illustrated above, see your local concrete block manufacturer.

#### Atlas Masonry Cement provides the right mortar

Even standard masonry units such as the bond beam block are being used to create decorative patterns in exposed masonry construction. The effect shown was achieved with this block in two sizes, laid back to back to form a screen-type wall.

Whether standard building block or any of the new-type masonry units are used, ATLAS MASONRY CEMENT provides the right mortar. That's because it produces a smooth, easy-to-work mortar... assures a stronger bond... gives weathertight joints that are uniform in color. And ATLAS MASONRY CEMENT meets ASTM and Federal Specifications. For information on masonry cement, write Universal Atlas, Dept. M, 100 Park Avenue, New York 17, N. Y.



Universal Atlas Cement Division of United States Steel

M-80

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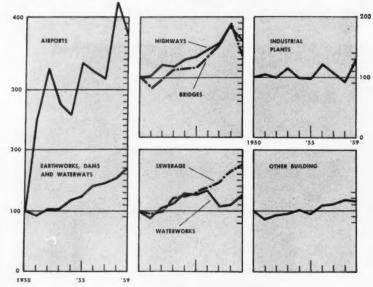
#### CONSTRUCTION BUSINESS . . .

continued

building construction contracts. However, the 11% drop in number of contractors was much less than the decline in dollar volume of highway awards, down 23% according to Construction Methods' figures. Still, more contractors in the \$100,000-Up bracket took on highways in '59 than any other type of heavy construction. Moreover, the drop in highway contractors was limited to the "million dollar & up" and the \$500,000 to \$1 million classes. About the same number of contractors in the smaller size group -\$100,000-\$500,000-had highway awards in '59 as in '58.

Last year's first decline since 1951 in the number of contractors doing at least \$100,000 a year in other-than-building is a temporary break in the strong uptrend. Big increases this year in highways and other types of work, will probably push the 1960 count to a new all-time high.

More building contractors took on industrial building jobs than Growth in the Number of Contractors\* Doing Major Types of Work

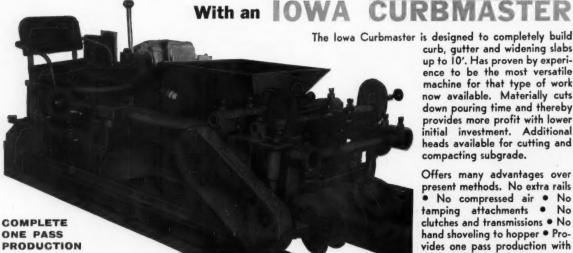


\*Heavy Construction Contractors with \$100,000 or more per year in contracts, reported by Construction Methods. Indexes based on 1950 = 100

any other type of building in 1959. Schools, which held the top spot in 1958, fell to second place as the number of \$100,000-Up tractors dropped 13%.

Slight declines of 1% to 2% in the larger heavy construction contractors last year contrast with the steady number in the \$100,-000-\$500,000 bracket.

#### YOUR CURB, GUTTER AND MODERNIZE WIDENING OPERATIONS



curb, gutter and widening slabs up to 10'. Has proven by experience to be the most versatile machine for that type of work now available. Materially cuts down pouring time and thereby provides more profit with lower initial investment. Additional heads available for cutting and compacting subgrade.

Offers many advantages over present methods. No extra rails No compressed air
 No tamping attachments • No clutches and transmissions . No hand shoveling to hopper • Provides one pass production with less hand labor.

In today's competitive construction, every minute saved is money in your pocket. Iowa Curbmaster cuts down on

labor costs, increases production. Proven to be true, no matter what method you now use to build curb and gutter.

Write TODAY for FREE literature and complete information.

#### Modernize! Economize! With Iowa Curbmaster

IOWA CONSTRUCTION EQUIPMENT CORPORATION

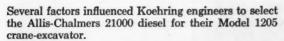
#### Here's TEAMWORK FOR PROGRESS



This 3½-yd Koehring 1205 has torque-converter drive—also available with mechanical drive.

# NOW...

# Koehring 1205 is powered by 21000 Diesel



Outstanding performance, of course, was the prime convincer. The 21000 provides plenty of power — and still works at far below its design capacity. Torque is consistently high throughout the entire working range — for both lugging ability and top performance at high speeds. Users report quick starting, without ether, in sub-freezing weather.

Modern design of the 21000, with its entirely new controlled-turbulence, open-combustion system, appealed to Koehring.

Big fuel savings - The turbocharged 21000 uses 8 to

27 percent less fuel than other diesels in its class. That means savings of up to 1 gallon in every 4!

Dependability to match — Since fuel is burned — it isn't left to "gook" up rings, valves, crankcase. Raw fuel doesn't wash away or dilute lube oil. Fuel makes horsepower, not waste heat. Further, there's tough, heavy-duty design, with "stay-on-the-job" durability in every part.

Pluses like these have led Koehring and other manufacturers to standardize on the 21000 and the companion naturally aspirated 16000 diesels. Get full information from your dealer or contact Allis-Chalmers, Engine — Material Handling Division, Milwaukee 1, Wisconsin.

Go first class...use

**ALLIS-CHALMERS** 

power in all your equipment



#### ENGINEER'S FIELD REPORT

PRODUCT

RPM DELO OIL

FIRM

C. H. LAWSON, INC.

#### Using RPM DELO Oil heavy-duty engines outlast equipment



C. H. Lawson, Inc. operates 78 pieces of road building equipment ranging from new to 15 years old, all using RPM DELO 0il. Only one engine has ever required major overhaul and that was not due to lubrication. Firm's chief mechanic, E. C. Miller, says,

"RPM DELO Oil has been used exclusively in all our heavy duty engines since 1944. In many cases, it has enabled engines to outlast the equipment." Euclid Earth Mover (above) gets a push from a bull-dozer to provide extra traction in wet earth.





TD 24 International (left), one of firm's 12 bulldozers, helps clear the way for a Route 50 by-pass at Riverdale, Maryland. This two year old tractor has operated more than 4,000 hours without engine repairs. Company owner, C. H. Lawson (right), reports that RPM DELO

oil shar ave ice

Oil keeps the engines in his equipment in such good shape that—regardless of operating conditions—they average approximately 4 years or 10,000 hours service before even minor repairs are required.

TRADEMARK "RPM DELO" AND DESIGN

STANDARD OIL COMPANY OF CALIFORNIA, San Franciso 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

#### Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrorosion of bearing metals
- Inhibitor resists crankcase foaming



For More Information or the name of your nearest distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF TEXAS, El Paso THE CALIFORNIA COMPANY, Denver 1, Colorado

#### SOME BIG CONTRACT AWARDS OF THE MONTH

Atoka Water Contractors, Inc., Oklahoma City, Okla. Construct 98.9 mi of 48-in. pipe line including six pumping stations, and terminal reservoir to transport water from Lake Atoka to Oklahoma City. Oklahoma City Development Trust, First National Bldg. \$53,448,594.

George A. Fuller Co., New York City. Erect three 30-story apartment buildings with associated shopping center and office buildings at Area 1 of the Washington Square Redevelopment Project in New York City. Webb & Knapp. Inc., 383 Madison Ave. \$25,000,000.

Morrison - Knudsen Co., Inc., Boise, Idaho, and Paul Hardeman & Associates, Los Angeles, Calif. A joint venture to construct 12 Atlas missile launching sites in the vicinity of Altus Air Force Base in Okla. Corps of Engineers, 616 S. Boston Ave, Tulsa, Okla. \$20,927,500.

Western Contracting Corp., Sioux City, Iowa. Construct Atlas missile launching sites in the vicinity of Lincoln Air Force Base, Neb. Corps of Engineers, 1709 Jackson St., Omaha 2, Neb. \$17,400,000.

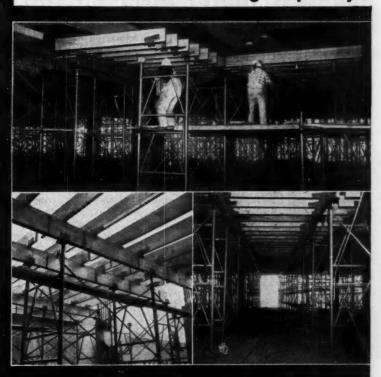
Hawaiian Dredging & Construction Co. Ltd., Honolulu, Hawaii. Construct 846 Capehart housing units including site preparation and supporting facilities at Fort Shafter and Schofield Barracks in Honolulu. Corps of Engineers, Bldg. 96, Fort Armstrong, Honolulu. \$14,318,941.

Brown & Root, Inc., Houston, Tex. Erect two bridges consisting of prestressed concrete girders and welded composite spans at Lake Pontchartrain near New Orleans, La. State Dept of Highways, Room 426, Administration Bldg., Baton Rouge. \$14,784,049.

William E. Schweitzer Co., Evanston, Ill. Construct four concourse buildings and terminal area at O'Hare Airport, Chicago, Ill. Dept. of Purchases, City Hall, Chicago 2. \$11,097,000.

Henger Construction Co., Dallas, Tex. Construct an 18-story apart-

#### here's DOUBLE shoring capacity!



# SAFWAY HEAVY FRAME SHORING

carries loads on 50% fewer frames; cuts erection and dismantling time

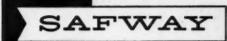
CARRYING up to 20,000 lbs. per frame, this equipment has twice the capacity of standard steel frame scaffolding. Thus any given load can be supported on half as many frames... with corresponding savings in assembly and dismantling time, transportation and storage. Also, heavier beams, slabs, roofs, etc., can be shored safely at virtually any height.

LOAD DISTRIBUTION — Frames carry 10,000 lbs. on each vertical leg—or 5,000 lbs. per leg plus 10,000 lbs. on high load-bearing top horizontal.

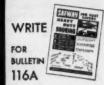
FEW PARTS—Only 3 frame sizes with screw jacks meet all job height requirements.

PRECISION HEIGHT ADJUSTMENT— With heavy duty screw jacks at the top, bottom or both.

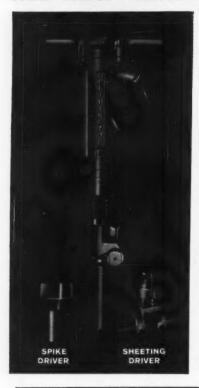
TOOL-LESS ASSEMBLY—Frames mount on coupling pins; cross-braces mount on studs with wing nuts.



SAFWAY STEEL PRODUCTS, INC. 6228 W. STATE ST., MILWAUKEE 13, WIS.



#### ALL-NEW HEAVY-DUTY BREAKER



From throttle to tool retainer, this 80 lb. class Worthington Blu-Brute paving breaker is all-new. It takes both spike and sheeting driver. And it's designed to give faster breaking with better operator control and less maintenance.

How? There's more than a dozen improved design features. They range from an easy operating progressive throttle valve to simplify starting moils through to a renewable front head bushing for low cost replacement of the wearing part of the chuck housing. Other features mean less operator fatigue . . . for example, the extended "steel run."

In addition, the WB-82 wears better because of the exclusive Worthington process: Blu-Coated parts.

The Blu-Brute paving breaker line is complete from the 20 through 80 lb. classes. See your nearest Worthington distributor for more information about the new WB-82. Or request bulletin from Worthington Corporation, Dept. 60-28, Holyoke, Massachusetts.





Carryable • Self-Priming • Lightweight

Exclusive PM engineering combines the advantages of replaceable iron volute with an aluminum body. 2" model weighs just 45 pounds! LOOK at these features:

- NO CHECK VALVE OR PEELER to clog or wear out! Saves you \$15 every 6 months!

  4-CYCLE ENGINE with automatic recoil starter
- \* 4-CYCLE ENGINE with automatic recoil starter and oil bath cleaner—Saves you \$20 labor per month!
- \* REPLACEABLE WEAR PLATE AND IRON
  VOLUTE—Saves cost of new pump every year!

  \* PATENTED IMPELLER DESIGN keeps seal
- \* PATENTED IMPELLER DESIGN keeps seal free of debris and dirt—Saves \$10 maintenance each month!
- \* SPECIAL LOW COST, LONG LIFE SEAL saves \$12 replacement cost!

Ask your Pm field representative for a demonstration today!



Manufacturers of the Thomas Electric Organ



LESCHEN WIRE THE ROPE DIVISION
H. K. PORTER COMPANY, INC.

CONTRACTS AWARDED . . .

continued

ment building and a 22-story hotel in Dallas. Carey-Schneider Investment Co., Medical Arts Bldg., Dallas. \$10,500,000.

Contracting and Material Co., Bernard, Ohio. Construct 75-mi of 30-in. gas pipe line from LaSalle to LaGrange, Ill. Northern Illinois Gas Co., 615 Eastern Ave., Bellwood. \$10,0000,000.

Fehlhaber Corp. & Terry Contracting Co., both of New York City. A joint venture to construct 0.8-mi of reinforced concrete roadway with asphalt surface on viaduct and associated repair and alteration of existing elevated structure for the Gowanus Expressway in Brooklyn, New York. State Dept. of Public Works, State Office Building, Albany. \$10,-830,123.

Dickmann - Pickens - Bond Construction Co., Little Rock, Ark. Erect a one story 1,000,000 sq ft manufacturing plant at Fort Smith, Ark. Norge Division, Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill. \$10,000,000.

R. B. Potashnick, Cape Girardeau, Mo. Construct section two of Dillon Dam for the Blue River Project near Denver, Colo. Denver Board of Water Commissioners, 114 W. Colfax St. \$10,815,430.

Diesel Construction Co., New York City. Erect a 21-story River View Motor Hotel including a five-story garage, swimming pool, and ice skating rink at 12th Ave. and 42nd St. in New York City. Glickman Corp., 565 Fifth Ave. \$9,500,000.

Winston Bros. Co., Minneapolis, Minn., Green Construction Co., Des Moines, Iowa, and Tecon Corp., Dallas, Tex. A joint venture to construct the Columbia Lock and Dam on the Chattahochee River between Ala and Ga. Corps of Engineers, Box 1169, Mobile, Ala. \$8,918,861.

Bor-Son Construction, Inc., Minneapolis, Minn. Erect a 400,000 sq ft shopping center in St. Anthony, Minn. Apache Realty Corp., Thorpe Bldg., Minneapolis, Minn. \$7,000,000.

continued on page 59



# NOW! a Euclid 14-yd! scraper

### with all-wheel drive!

# TS-14 features that cut dirt moving costs

2 engines — 296 total h.p.
all-wheel drive
NoSpin differentials
2 Torqmatic Drives
converter lock-up
20 yds. heaped
(14 yds. struck)



\*heaped capacity at 3:1 is 16 yds., at 1:1 slope, 20 yds.

HERE'S BIG NEWS for scraper users. The many cost cutting advantages of all-wheel drive are now available in a medium-size scraper, the Euclid Model TS-14. With Twin-Power and a total of 296 h.p. this new "Euc" has already proved itself an outstanding performer. A <u>one-man, one-machine earthmoving spread,</u> it gets more work done at lower cost than any other scraper of comparable size... its high productive capacity brings a better return on investment.

Like the widely used 24 yd. "Twin", this new Euclid has a separate Torqmatic Drive and power train for each axle. It self-loads in practically any scraper material and with a pusher is a big producer on even the toughest jobs. There's plenty of power and traction to pick up a heaped load in a hurry... pull out of the cut fast... and highball on the haul and return.

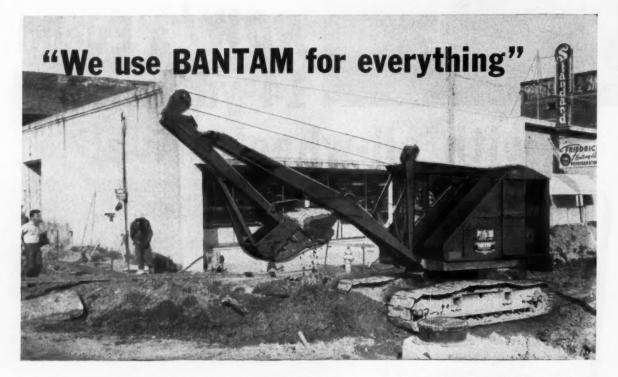
The TS-14 works on grades and under adverse job conditions that stall other scrapers. Its ability to do a wide range of work—without pusher assistance—makes it the most versatile scraper in its class. This new "Twin" can lengthen your work season and give you a bidding advantage on that next job. Get the facts and figures from your Euclid dealer. EUCLID Division of General Motors • Cleveland 17, Ohio

Check the advantages of all-wheel drive in this new TS-14 Twin-Power Scraper!



#### EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



#### Independent travel and all-job versatility save time and money for big contractor

The T. L. James Co., Inc., of Baton Rouge, Louisiana, puts BANTAM's versatility and fast, easy action to work on all kinds of jobs. They are hours and dollars ahead on every job-excavating, laying pipe, loading trucks, handling materials, etc. "We use BANTAM for everything," says W. F. Chamberlain, job foreman. "The way we can walk and swing at the same time with our BANTAM, the easy operation, speed and good visibility make this the best machine for our kind of work." (Two-speed, independent travel is standard on BANTAM C-350.)

A case in point is this big storm sewer job under city streets. BANTAM excavated to 5- and 6-foot depths, hauled out old concrete slabs and put down 24-inch pipe-all in a maze of vital utility service lines, and all done without disturbing one of these functions. As Mr. Chamberlain tells it, "BANTAM's best for visibility. The operator sits close to the bucket. He can dig for services and feel his way without hazard. We save time and money because we don't tear up service lines when we dig with BANTAM."

#### CHECK BANTAM'S PROFIT POSSIBILITIES YOURSELF

Whether excavating in tight quarters or handling big lifts, BANTAM is tops because it's unequaled in its class for production. And BANTAM lets you custom-make your rig to match your job and price needs exactly. Choose from more than 25 job-speeding optional features and get the most job-versatile rig you can own-BANTAM. See your BANTAM distributor today-ask for a demonstration.



Husky BANTAM C-350 hauls out heavy block of old concrete without disturbing vital service lines in the ground.

WORK AND EARN WITH 11 BANTAM-BUILT ATTACHMENTS



BANTAM T-350, 11-ton capacity -choice of four BANTAM-bui



11-ton capacity— self-propelled model;

CM-300



221 Park Street, Waverly, Iowa WORLD'S LARGEST PRODUCER OF TRUCK CRANE-EXCAVATORS

Page 58-CONSTRUCTION METHODS and Equipment-June 1960

#### CONTRACTS AWARDED...

The Horvitz Co., Cleveland, Ohio. Construct concrete pavement on the E. 14th St. Bridge and adjacent areas. State Dept. of Highways, Columbus. \$6,459,425.

Lease Co., Inc., Seattle, Wash. Erect a mental hospital in Anchorage, Alaska. State Dept. of Public Works, Juneau, Alaska. \$5,683,835.

General Investment Co., Longview, Wash. Construct 330 Capehart housing units at Larson Air Force Base, Moses Lake, Wash. Procurement Office, Larson Air Force Base. \$5,295,000.

George M. Brewster & Son, Inc., Tustin, Calif. Grading and paving for 13-mi of eight lane freeway in Long Beach and Los Angeles, Calif. State Division of Highways, 1120 N St., Sacramento. \$4,825,808.

Morley Construction Co., Los Angeles, Calif. Construct an addition to the Los Angeles City College. Board of Education, 1425 S. San Pedro St., Los Angeles. \$3,894,000.

Kroening Engineering Co., Milwaukee, Wis. Construct the Cardinal Strict College in Glendale, Wis. Sisters of St Francis of Assisi, 3195 S. Superior Ave., Milwaukee. \$10,000,000.

Vinnell Corp., Los Angeles, Calif. Construct 1-mi of eight-lane highway for the Golden State Freeway in Los Angeles. State Division of Highway, 120 S. Spring St., Los Angeles. \$9,693,235.

R. H. Fulton & Co., Lubbock, Tex. Construct 126-mi of 30-in. gas pipe line in New Mexico. El Paso Natural Gas Co., Bassett Tower, El Paso, Tex. \$6,300,000.

Fruin-Colnon Construction Co., St. Louis, Mo. Construct an addition to a brewery plant. Falstaff Brewing Corp., 5050 Oakland Ave., St. Louis. \$4,800,000.

Florida Builders, St. Petersburg, Fla. Erect a 12-story office building and bank with drive-in facilities in St. Petersburg. Citizens Plaza Corp., 700 43rd St. \$3,000,-000.



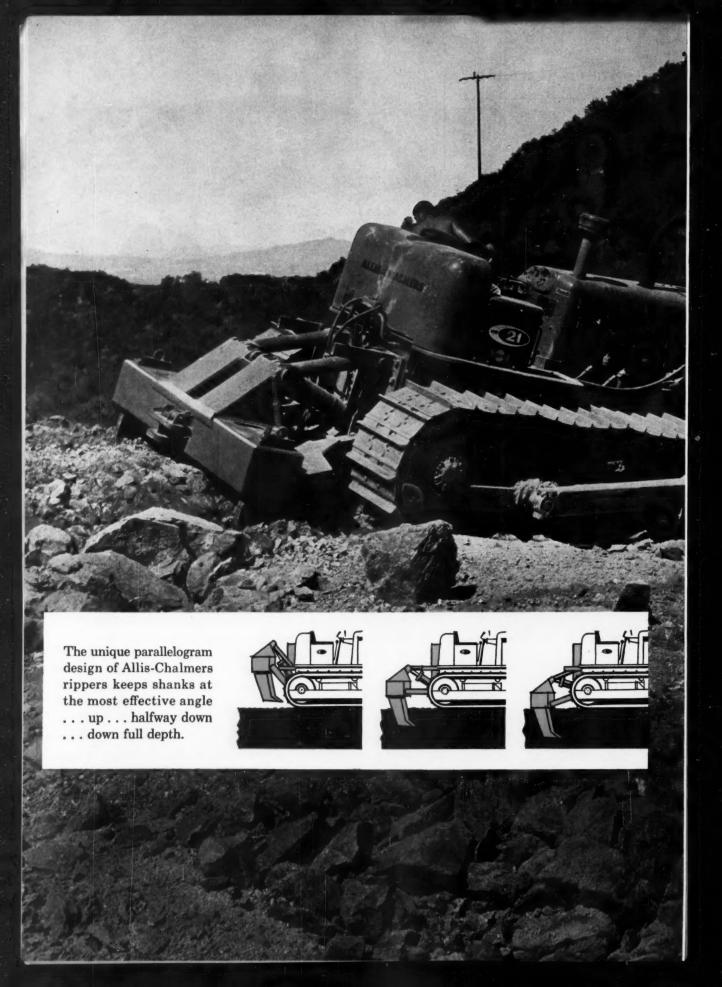
#### WHO PAYS WHEN THEY SEE RED?

When one of your workmen or a passer-by gets hurt, let Travelers take over. Workmen's Compensation and Public Liability claims will be handled with efficiency, speed and courtesy. No worry for you. No bad feeling left over.

Best of all, The Travelers can also help you *prevent* accidents. A Safety Expert seeks hidden hazards and prescribes safe working methods with the know-how of years of experience. (The Travelers was the first insurance company to organize an Engineering and Loss Control division for accident prevention in business.) This not only prevents accidents—it reduces costs, too.

For Workmen's Comp and Public Liability insurance, for Bonds, Builders' Risk and Contractors' Equipment Floaters, for any kind of business insurance you need—talk to your Travelers man. There's one nearby wherever you are.

# THE TRAVELERS Insurance Companies HARTFORD 15, CONNECTICUT





### TOUGH TOOLS MATCH TOUGH JOB POWER

Allis-Chalmers rear-mounted rippers maintain most effective penetration angle at all depths...up front, specially designed bulldozers make most of HD-21's tremendous power.

Modern tractor power, plus modern ripper and dozer design, is making a big difference on today's tough jobs. With the HD-21 and ripper, for instance, up to 60,000 pounds of drawbar pull let you rip 'n' doze what you once shot and shoveled . . . puts one man, one modern machine in place of a typical 4-man blasting operation.

Allis-Chalmers leads the field in making rippers practical and effective for these tough jobs. The introduction of parallelogram design — unique Allis-Chalmers feature on these big HD-21 rippers — keeps shanks at most effective penetration angle at all depths. You get the same effective tooth angle ... up ... halfway down ... or working a full two feet deep!

In addition, Allis-Chalmers dozer design utilizes the latest developments in steel to produce durability which makes the most of today's big tractor power without profit-killing maintenance and repair. Trunnions, "C" frames, struts and moldboards match the HD-21's brute strength. If you're bidding or working any tough materials, your Allis-Chalmers dealer will furnish all the facts on successful ripper/dozer application. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.



move ahead with

**ALLIS-CHALMERS** 



power for a growing world



#### Had any accidents down on the floor lately?

Working a deep cut can be hazardous business. Noise and congestion team up to cause bodily injuries and raise your insurance rates. Liberty Mutual engineers are experienced in studying work sites and setting up traffic patterns. They know machines and they know men, and they can help you safeguard both to improve your odds against accidents and losses. This safety engineering is but one of the many Liberty Mutual services that add up to protection in depth. To learn more about Liberty's protection in depth and how it can help lower your business insurance costs, contact your nearest Liberty Mutual office.

#### Look for more from LIBERTY MUTUAL

CIBERTY MUTUAL INSURANCE COMPANY - LIBERTY MUTUAL FIRE INSURANCE COMPANY HOME OFFICE: BOSTON

...the company that stands by you

Susiness Insurance: Workmen's Compensation, Liability, Group Accident and Health, Fire, Fleet, Crime . Personal Insurance: Automobile, Fire, Inland Marine, Burglary, Homeowners,



PICTURE OF THE MONTH

#### Four Cranes Erect Big Girder

• One of the biggest girders ever erected in one piece in New York City goes onto its piers in the new Bruckner Blvd. elevated expressway. Girder is 177 ft long, 12 ft deep, and weighs 131 tons. It was fabricated in one piece by Ingalls Iron Works Co. in their Verona, Pa., shops and brought by rail, barge, and truck to the site. Four Manitowoc cranes lifted it off the trucks and onto the piers in half an hour. The erection was done by the Owen J. McGarrahan Co. of Cambridge, Mass., early on a Sunday morning to avoid interference with the extremely heavy traffic that travels Bruckner Blvd. on weekdays. McGarrahan has the contract to erect 8,000 tons of structural steel for the first phase of the expressway project.

SPECIAL HYDRAULIC DUMP TRAILERS

# GREATER PAY LOAD



spread axle design meets most state requirements



New Exclusive Dunham design uses 10,000# single axle tractor yet carries 22 ton legal payload, almost same as tandem tractor rigs costing much more . . . a big saving in capital investment.

Triple cylinder hoist offers ultimate in security and operating performance for frameless trailers.

Ruggedly built for off-road on-road operation.

Versatility makes it ideal for hauling coal, light weight aggregates, raw sugar, cement, lime, sand, gravel, dirt, clay or iron ore. Delivers asphalt through all make spreaders . . . delivers dry-batch through concrete pavers.

Cut your operating costs... be competitive ... "Let a DUNHAM carry your load!"



Dunham Trailers Division of Anderson-Dunham, Incorporated

Sales office and factory: Post Office Box 431 • Minden, Louisiana • Telephone: FRanklin 7-3535

Manufacturers of Hydraulic Dump Traiters . Hydraulic Dump Truck Bodies . Truck Mounted Concrete Mixers

NOTE TO DISTRIBUTORS. We are looking for good distributors in the following states

North Carolina rginia Maine

Indiana Nebraska

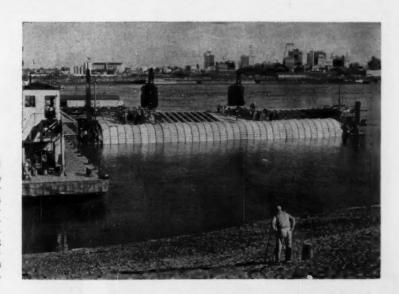
Pennsylvania and a good export outlet

We finance retail sales for distributors

#### Construction News in Pictures ...

#### **River Taming**

As part of their continual battle to keep the Mississippi River under control, the Corps of Engineers has developed this technique of articulated concrete revetments to prevent bank erosion. Special mattress-laying plants lay 4,000 4x25-ft mats in a 20-hr day to form a continuous mattress extending from the bank well out into the river.





#### **Welded Skyscraper**

In traditional topping-out ceremony, crews position last column of the 31-story, \$20-million Western Electric Building in New York City's financial district. Building is the second largest all-welded steel building in U. S. (Houston's First City National Bank beats it by one story). Dreier Structural Steel Co. of New York had steel contract.

#### Tricky Lift

American 40-ton truck crane, Skagit double-drum Model BU 140 hoist, and two 150-ft Bigge gin poles all combine to lift into place a 95-ton, 120-ft high digester at the San Joaquin mill of Fibreboard Paper Products Corp. Bechtel Corp., engineer-constructors for the project, expect to complete the \$14-million plant addition sometime this fall.

continued on next page

#### Crane Cableway

To lower stone and fill down 180 ft at 160-ft radius for an observation tower at the Niagara Power Project, Buffalo Structural Steel Co. adapted a 25-ton Lorain Moto-Crane with a 50-ft boom. They rigged the main load line as a trolley to a pier at the gorge bottom. Snatch block and cargo net on this line are moved by crane's second line.



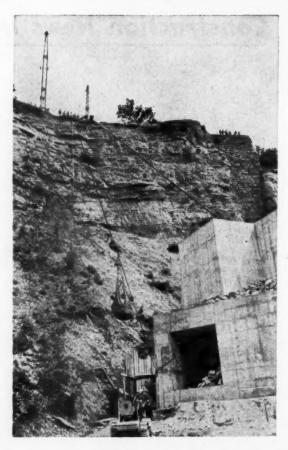
#### Second Deck

Bethlehem Steel Co. crews place the first structural steel section for the New York side of the over-theriver section of the six-lane lower deck of the George Washington Bridge. The deck assembly weighs 182 tons, is 108 ft wide, 98 ft long, and 30 ft deep. It is being raised 200 ft from a barge anchored in the river beside the New York tower.

#### **Engineering Center**

The United Engineering Center in New York City comes one step closer to reality as workmen place the first steel columns in the 20story, \$12-million structure. United Nations building is in the background. The Center will house 18 major engineering societies, is being financed by contributions. Turner Construction has contract.

continued on page 70



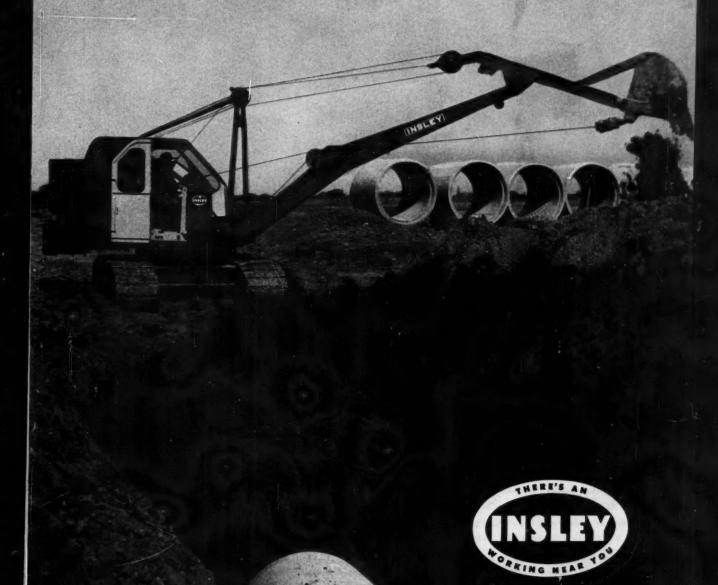


#### Each bite's a profit bite

● Put the Insley M backhoe on the job and watch how it moves more earth in any given time. That's because the Insley M takes a full bite—plus that extra amount that means extra profits. The Insley M is a full ¾ cu. yd, machine—on paper and on the job . . . and it's "power matched" for a profitable combination of performance, efficiency and long life.

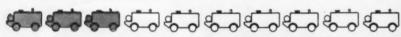
See your Insley distributor and let him show you an Insley M working in your area. See how it meets your requirements, as an excavator, self-propelled crane or truck crane. And get the facts on the complete line of Insley machines—5 to 45 ton crane capacity,  $\frac{1}{2}$  to  $1\frac{1}{2}$  cu. yd. bucket capacity, crawler, self-propelled carrier and truck mountings.

INSLEY MANUFACTURING CORPORATION
Indianapolis 6, Indiana





# Why your next 900' compressor will



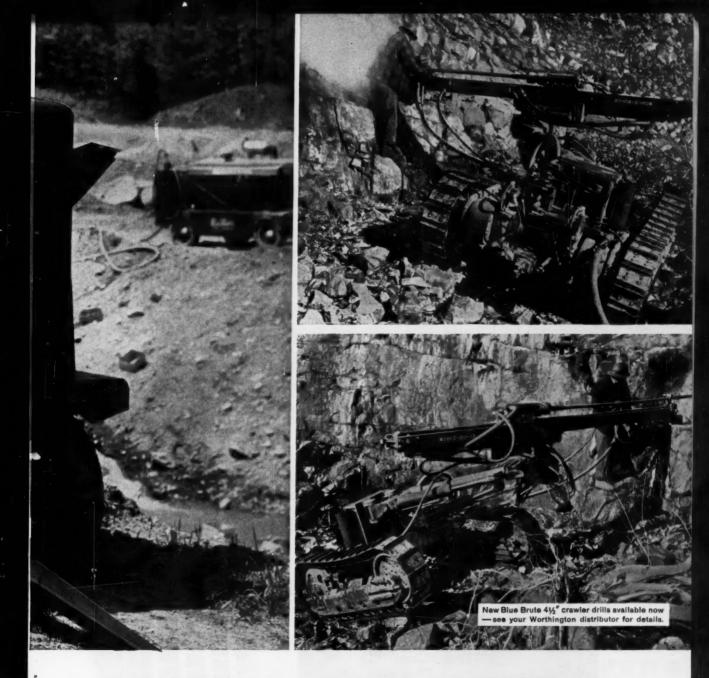
Most manufacturers build their small rotary compressors with end-to-end design. Only 3 out of 10 produced use over/under construction (shown in blue)...



Yet in the  $900^{\circ}$  size, more over/under units are sold than any other. The story opposite tells why...

If you looked inside every rotary compressor on the market you would find one major difference that separates the men from the boys.

A few manufacturers build their rotaries with over/under design: i.e. the compressor's second stage is directly underneath the first. This results in an improved rotary with many benefits. The cylinders are self-draining (this stops clogging) and easy to get at for repairs. All principal parts can be re-



# most likely have over under design

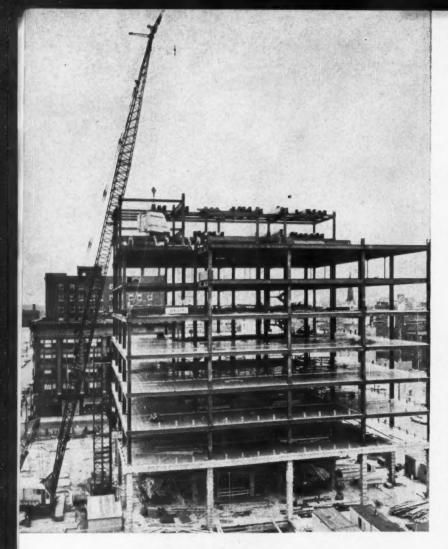
moved for inspection and replaced in a hurry.

The superiority of over/under design is indicated by the fact that in the largest, most expensive size (the 900' unit) more over/under rotaries are bought than any other kind. Yes, it takes over/under design to handle heavy jobs, such as operating two Worthington 4½" Blue Brute drills which get maximum drilling footage with least air consumption and less maintenance.

Worthington is one of the few manufacturers that offer over/under design in every compressor in its line. Worthington Blue Brute rotaries made with over/under design are built in 125', 210', 315', 365', 600' and 900' sizes. (A single-stage 85' rotary is also available.) There's a complete line of Blue Brute drills, too—right through the 4½" size. Ask your nearby Blue Brute distributor for a demonstration. You'll find him in the Yellow Pages under

"compressors." Or write Worthington Corporation, Dept. 60-24, Holyoke, Mass. In Canada: Worthington (Canada). Ltd., Brantford, Ontario.

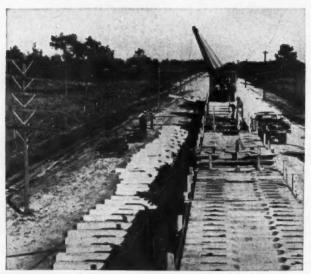




CONSTRUCTION NEWS
IN PICTURES... continued

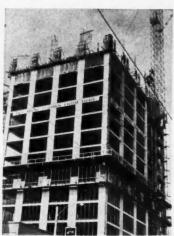
#### **Big Lift**

When a crane was needed for work on the upper stories of the new Libbey-Owens-Ford Glass Co. executive office building in Toledo, Ohio, crews of A. Bentley and Sons Co. lifted it up to the seventh floor with a Manitowoc Model 3900 crane. The lifting crane has a 200-ft boom and a 30-ft jib. Bentley Co. is subcontractor for the erection of the main structural steel.



#### **Prestressed Railway Ties**

Crane unloads prestressed concrete railway ties for installation on experimental section of track in Tampa, Fla. A new Tampa company, the American Concrete Crosstie Corp., is developing and testing the new ties. When the design and production are perfected, the scheme could cut track costs.



#### **Public Relations**

Builders of this 22-story, \$6-million office building in Atlanta for the Georgia Power Co. believe in keeping the public informed. General contractor Henry C. Beck Construction Co. of Dallas, Tex., hangs banners on all four sides of the building announcing how many floors are still to go. Smaller numbers label the individual floors.



## FIRST - BY TODAY'S STANDARDS ... CURTISS-WRIGHT EARTHMOVERS

Today's construction industry is a tough business . . . Competition is keener, jobs are bigger, bidding is tighter than ever before. To stay on top under these conditions, you need equipment with the features that guarantee you top production. In the scraper field, that equipment is made by Curtiss-Wright. Model for model, right across the board, the Curtiss-Wright line piles up more production and makes more profit per hour than any competitive machine. Prove this on your job! Weigh the loads, time the cycles, check the bowl factors, compare the hourly profits against any other scraper — see for yourself what makes Curtiss-Wright the industry's fastest growing scraper line.

SOUTH BEND DIVISION

#### **CURTISS-WRIGHT CORPORATION**

SOUTH BEND, INDIANA

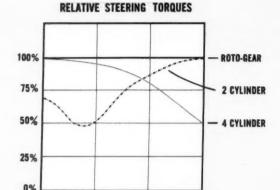
Distributed in Canada by Canadian Curtiss-Wright Ltd.

TURN PAGE

#### SELF-PROPELLED SCRAPER STEERING SYSTEMS

Control is of great importance when handling loaded scrapers with weights in excess of 80 tons. Steering must be smooth and responsive in all stages of operation. Anything short of this sacrifices production, safety and operating ease.

The graph on the right compares typical steering torque curves for the three steering systems now used by major scraper manufacturers. The curves shown are actual torque curves from current models. As you can see, the Roto-Gear torque is consistent throughout the steering arc, while the torque of the 2 cylinder and 4 cylinder ram & lever systems vary considerably at different points in the turn.



RELATIVE TORQUE DEGREE OF TURN

#### TWO CYLINDER STEERING

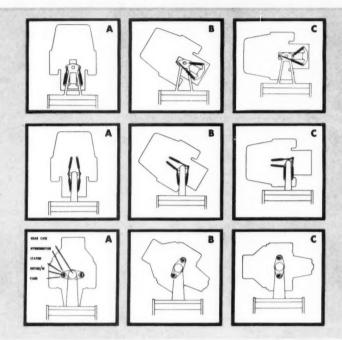
In this system, each of the two double-acting rams works in opposition to the other. Note that in the position indicated in figure 'B', the right arm is in a direct line with the pivot point and can neither push nor pull. Therefore, the right ram must coast through this point leaving the left ram to do the work. This accounts for the loss of torque at this point as shown on the above graph.

#### FOUR CYLINDER STEERING

In this system the two left rams work together and the two right rams work together. All rams are double acting. With this system, the more nearly the rams are in a straight line, the more effective the steering. As they approach a right angle position, relative to each other, they lose their effectiveness and suffer a loss of steering power. This will be noted on the graph above.

#### ROTO-GEAR STEERING

In the Roto-Gear system, there is an even constant pressure against the Hydromotor vanes at every point in the turning arc. Both Hydromotors are in full operation at all times—providing even power throughout the turn.

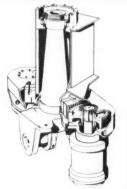


#### ROTO-GEAR STEERING SYSTEM

With Roto-Gear steer, there are no hydraulic rams. Instead, With Roto-Gear steer, there are no hydraulic rams. Instead, compact Hydromotors operate the steering gear. As the turn is begun, the hydraulic pump sends fluid into one side of each Hydromotor, causing pressure against the rotor vane. The rotor of each Hydromotor then turns, causing the steering gear to turn in relation to the turn of the steering wheel. The advantages of this system, used ONLY on the Curtiss-Wright scraper line, are (1) Smooth, responsive steering throughout the entire turn, and (2) Elimination of awkward, external steering rams. of awkward, external steering rams.

For complete details on all the C-W performance features,

see your Curtiss-Wright distributor.



DETAIL OF HYDROMOTOR GEAR MECHANISM



CUT-AWAY VIEW OF C-W HYDROMOTOR

SOUTH BEND DIVISION



SOUTH BEND, INDIANA Distributed in Canada by Canadian Curtiss-Wright Ltd.

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Higher Profit Dump-Trailers—Fruehauf offers a wide range of single and tandem axle hoist and cable Dump-Trailers with bigger payload capacity and superior hauling efficiency. Hoist-type Dump-Trailers, in steel or frameless aluminum, offer weight savings up to 3,500 pounds for higher profit, lower-cost hauling. Sand and gravel units or rugged rock bodies available to fit your hauling needs. Fruehauf Dump-Trailers are the toughest, most durable, highest profit units on the market.





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June 1960—CONSTRUCTION METHODS and Equipment—Page 73



# THE ALL-NEW ALEMITE 7138 V.P. PUMP for newest multi-purpose lubricants!

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The Model 7138 is endorsed by major oil companies for use with multi-purpose lubricants. Typical applications in the construction industry include servicing of power shovels, back hoes, bulldozers, power graders and small drag lines. Ideal in the mining industry for lubricating coal cutters, loaders and borers.

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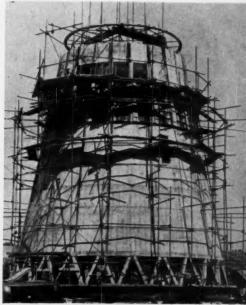
## Construction 'Round the World . . .





#### In Australia

Kaiser Engineers' workmen lower a skip-mounted 24-ft-long section of steel penstock liner into pressure shaft at Snowy Mountains Hydro-Electric project. Shaft is 935 ft long, 11½ ft in dia, and slopes 54 deg. Henry J. Kaiser Co. is the joint-venture sponsor for the \$45-million job, largest civil contract ever awarded by the government.



#### In Austria

Sheetmetal panels serve as forms during the construction of hyperboloid cooling tower for a power station being built by the Lower Austrian Electric Co. at Neusiedel/Zaya. Richard Demelius of Vienna designed four standard panels that can be reused to form the 24-side tower, which is 75 ft high and has a gradual upward concave slope.

#### In Great Britain

Two railroad cranes lower a prestressed concrete cap onto center masonry pier of 85-year-old bridge that carries Western Region main line tracks across Avon River near Evesham. Railway labor handles erection. Remodeling project includes strengthening the pier and removing old cast iron pilings to create two instead of four spans

continued on next page

### CONSTRUCTION 'ROUND THE WORLD...continued

#### In Great Britain

Crew withdraws the casing after the bulb has been formed for one of 500 cast-in-place concrete piles for oil storage tanks and a boiler house at Wandsworth Depot of Shell-Mex and BP, Ltd. H. D. Foundations is driving the 30-ft-long piles, which are 16½ in. in dia, through poor clay and filled ground soil with a Delmag diesel hammer.





#### 4- In Russia

The MI-4 helicopter is erecting transmission towers on a trial basis in remote areas of the Caucasus and Koilsky Peninsula. The plane, which has a 1-ton hauling capacity, flies materials in, then aids in construction. According to a Soviet industrial newspaper, the helicopter can lift an electric transmission tower into place in 3 min.

#### In France (below)

Traveling tower crane erects prefabricated panels for a 5-story apartment house in a suburb of Paris. Edmond Coignet took only nine days to complete superstructure, 40 days for the entire building. Each Coignet panel is a whole wall, ceiling, floor, or partition, Exterior walls are sandwiches of concrete and insulation.

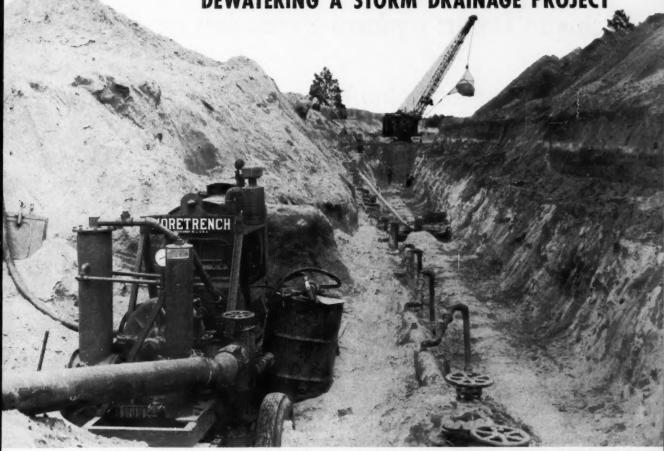


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ECONOMY IN ACTION:

## **MORETRENCH WELLPOINTS**

DEWATERING A STORM DRAINAGE PROJECT



Bordeaux Storm Drainage Project, Fayetteville, North Carolina Contractor: Crowell Constructors, Inc., Fayetteville

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## **Production up 16%**

Michigan Dozer: replaces 2 crawlers on fill

Michigan Pusher: eliminates crawler track costs

Michigan Scraper: more loads per shift



On L. A. Reynolds job in Florida, 375 hp, 74,000 lb Michigan Model 380 Dozer push-loads Model 210 Michigan Scraper to 15 pay yd spill-point in under a minute.

Model 380 push-loads just as effectively in reverse as forward. Tractor thus saves backup and positioning time.



## profit up too

On Interstate work near Orlando, Florida, an enterprising contractor has boosted normal production % or more—cut his man-hour requirements—and upped profits.

The firm is L. A. Reynolds Company, Winston-Salem, North Carolina. Their job: an 850,000 yd double figure-eight interchange. Their "secrets": a unique way for quickly drying wet material—plus three new high-speed machines—all Michigans—a 262 hp Model 280 Tractor Dozer, a 375 hp Model 380 Tractor Dozer and a 19-yd Model 210 Tractor Scraper.

#### Deep ditches, strip loading help overcome moisture problems

Let's talk about their "drying" method first.

The problem here involved overcoming the effects of 97 inches of rain (in 11 months) and a water table only six inches below ground level. Frank and Herbert Reynolds, two of the four brothers who own the company, plus their job supt, Ernest Wilcox, devised this solution. With draglines, they dug perimeter ditches 10 to 14 ft deep around their entire 47 acre borrow pit. Water was allowed to drain from most areas for days. Dirtmoving, started at the ditch lines, was worked toward higher ground in 100 ft strips; this gave the water table even more chance to lower itself.

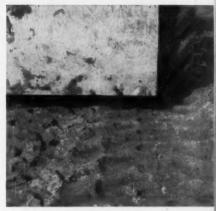
### Pusher loads alternately forward and reverse

Loading too played a key role in the profit picture. To take advantage of their Model 380 Michigan Dozer's four speed ranges in both forward and reverse, unit was equipped with push-blocks both front and rear. Thus, throughout the job, the Model 380 loaded scrapers in alternating directions, saving all turns and all backup time. Rig serviced four scrapers with time to spare . . . regularly loaded and boosted each scraper out of the cut in under 1 minute. Load size ranged from 14 to 16 pay yards, scale-measured, depending on which of the eight kinds of material was encountered-ranging from quicksand to sandy clay.

"With scrapers on fair haul roads," says Supt Wilson, "the torque converter-power shift transmission Model 380 accounted for 40 or 41 loads per hour. In better material, the high-speed Model 380 turned out as many as 68 loads per hour."

### Dozer spreads 7,200 yds, also does odd jobs

Similar speed advantages were reported on the fill. Here, Reynold's 56,000 lb Michigan Model 280 Dozer replaced two 50,000 lb class crawlers. It had no trouble keeping up with the four scrapers—spreading up to 7,200 pay yards per day along a ¼ mile long, 108 ft wide right-of-way.



Low-pressure wide-base tires provide adequate pushing traction even in this soft sand.

In addition, the Model 280, with its go-anywhere 28 mph mobility, had time to travel off the fill—keep haul roads in shape, muck out topsoil and gumbo, perform emergency tasks.

### More dirt, fewer dozers add up to more profit

But most important, perhaps, was the continuous profit story. Operator load-counts showed an average of five extra loads per 10-hour day for the power-shifted, torque converter-equipped Michigan Tractor Scraper. Cross-section computations, Michigan Model 380 vs the 320 hp crawler-pusher formerly used, showed an extra pay yard or two per load for all scrapers. In addition, with rubber-tired machines replacing crawlers, there was a substantial saving in track repair costs. Still more money was saved in operating costs, two dozers vs three.

With a Michigan Tractor Dozer or two, we honestly think you can get similar results. Why not at least see? There are four Michigan Tractor Dozer models—162, 262, 375, and 600 hp—call your Michigan Distributor for a demonstration. The test will cost you nothing . . and it may put thousands of dollars in your pocket.

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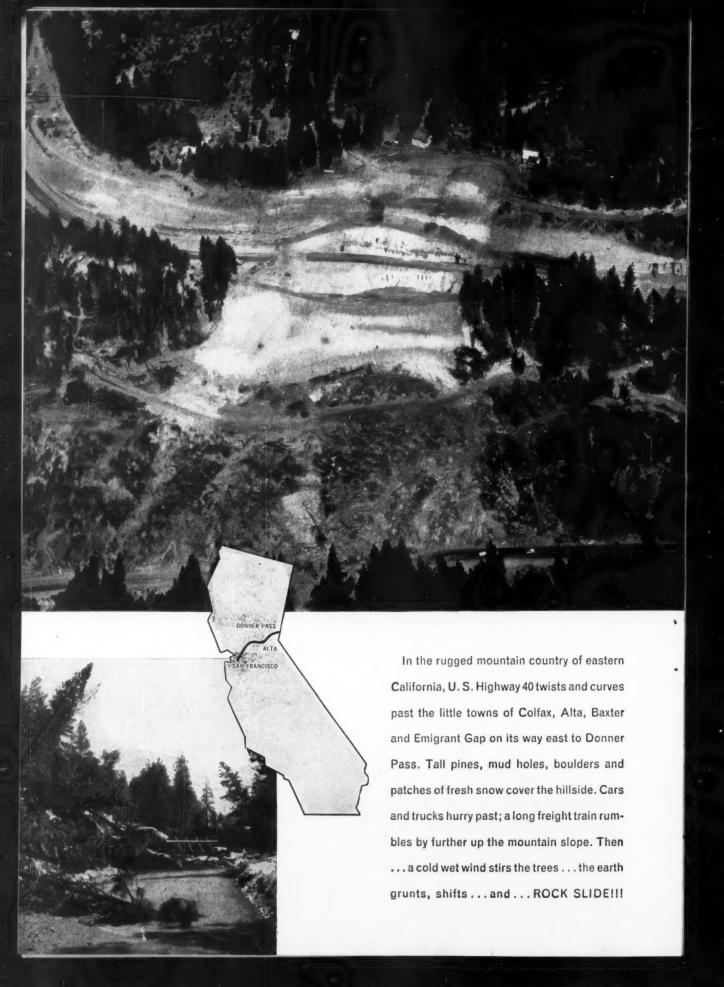
CLARK EQUIPMENT COMPANY
Construction Machinery Division



enton Harbor 30, Michigan Canada: Lanadian Clark, Ltd. I. Thomas, Onlario

Keeping up with four haul units, the one 262 hp, 56,000 lb Michigan Model 280 spreads fill over 1400 x 108 ft area. Job used to require two crawlers.





## Giant mud slide blocks U.S. Highway 40. Traffic stopped until Michigan goes to work

# 4-yd Tractor Shovel clears huge boulders

Early last winter, 100,000 cubic yards of mud, rock and earth tore away from a mountain-top near Alta, Calif. The wave toppled trees and sucked up boulders—picked up speed as it tumbled down to Highway 40—dumping its load across the road shoulders and pavement.

To put ruffled nature back in place, the State of California, Division of Highways, called for bids. J. O. Archibald Company, general contractor from Red-Food City, was awarded the job.

Archibald rushed his normal earthmoving fleet of scrapers, tractors, shovels and trucks to clear the highway, and to stabilize the hillside by terracing. But as they cleared away mud and rock, volcanic ash and sandstone, work crews came across giant boulders that required special treatment. Archibald didn't want to blast any more rock than necessary. Blasting would add to the cost of the project. Hoses and compressors would slow earthmoving. And any more vibration might set off another slide!

#### Special rock, special tool

So Archibald scanned his equipment roster, then selected a Tractor Shovel that in four passes was loading out 18 and 20 yard haul trucks. His machinea Michigan Model 275A—swung a big bucket, all right. Four yards. But big enough to handle the big rock? Say a boulder 10 feet in diameter?

It became Operator F. E. "Mac" Mc-Kinsey's job to find out. Mac had put in lots of time on Archibald's 2½-yd Michigans—also had clocked almost 200 hours on the new 4-yd Model 275A. But that was more-or-less straight truck-loading work. What could the 275A do halfway up a mountainside, working in treacherous, muddy footing, on steep slopes, moving boulders as required to a gully half a mile away?

#### Carries 8 tons, dozes 10

Under these conditions, the Michigan went to work. First, the operator edged Michigan's bucket lip under a typical giant boulder. Then, careful work of the hydraulic controls gently raised and tipped the bucket as operator felt his way under the huge rock. If the boulder could be lifted, more than likely it could be carried. And it was, load kept low—just off the ground.

So the job continued, the Michigan by itself moving a stream of 8 to 10 ton boulders to the dump area. Even when a rock was too big to see over, Michigan

carried it . . . the operator simply driving in reverse. Power steer and identical speeds forward and reverse made this easy. Other times, when boulders weighed over 10 or 11 tons, or when one was so odd-shaped it couldn't be carried in the bucket, the 262 hp Michigan simply dozed it the half mile to the edge of the gully.

### Goes through muck, up mountain sides

"I felt like a hero on the job ... sort of a King of the Hill," recalls Operator McKinsey. "Not only because of the huge rock and the fact that the Michigan eliminated blasting. But I ran up steep slopes with the Michigan that a sixwheel truck couldn't climb. I plowed right through mud that stopped crawler-tractors. I had the wonderful feeling of power—and I felt safe as I handled this big stone on that rough terrain."

Could the ability to handle 4 yds—lift up to 11 tons per pass—help solve your production problems? To help you judge for yourself, we'll be glad to show you a Model 275A in action. Or, if you prefer, to demonstrate to you any of seven other Michigan Tractor Shovel models, 16 cubic feet to 6 cubic yards. Call to arrange time and place.

Typical boulder carried by Michigan. Its weight, about nine tons.



Huge boulders, over 11 tons, were dozed by Michigan to dump.



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# Construction Methods EQUIPMENT

JUNE, 1960

VOLUME 42 . NUMBER 6

HENRY T. PEREZ, Editor

### Unhappy Birthday

THE FEDERAL HIGHWAY ACT OF 1956 will celebrate an anniversary on July 1—on that date four years ago the grand plan for highways went into effect with much fanfare. It included provision for a "National System of Interstate and Defense Highways," currently programmed at 41,000 miles.

Now, on the eve of its fourth birthday, the interstate program is in serious trouble. A Congressional committee has uncovered serious irregularities on an interstate job in Oklahoma.

The results of the committee's hearings (page 13) paint an ugly picture, to say the least. And from them, the general public is liable to get the impression that the whole federal-aid roadbuilding program is riddled with graft. If this feeling persists, the public support—and funds—needed for modernizing and rebuilding our highway network will dry up.

The Oklahoma scandal is not unique. Dishonest contractors and unscrupulous public officials have made shady deals since the beginning of time. Such practices should be condemned, of course. But they are the exception rather than the rule. It would be a crime if the highway program were allowed to founder on one or two evidences of wrongdoing.

The fourth anniversary of the implementation of the highway act is an opportune time to counteract the unfavorable headlines made by the investigating committee. It is an opportunity to point out the progress made in the past four years—and that progress is a whale of a lot more than one poorly constructed by-pass in Oklahoma!

Since July 1, 1956, construction contracts have been completed on more than 6,000 miles of interstate highways at a cost of over  $$2\frac{1}{2}$  billion. Construction is now underway on an additional 5,000 miles, estimated to cost around \$3\$ billion.

On the primary, secondary, and urban (ABC) system, 85,000 miles was completed. Cost?  $$5\frac{1}{4}$  billion. And as of last month, 24,000 miles were under contract at an estimated cost of more than  $$2\frac{1}{4}$  billion

Bringing these facts to the attention of the people throughout the country—and re-alerting them to the vital part highways play in the nation's defense and economy—is the job of everyone concerned with the construction industry. Let's tell our story honestly and forcefully. Let's get the general public on our side and keep it there.



INSIDE THE RESERVOIR—Crews work inside one of two 190x553ft basins that comprise Hillcrest Reservoir. Rig in foreground drills for concrete footings, or caissons, that extend 11/2 ft above the ground. These footings support concrete barrel arches that

## Concrete Reservoir Requires

Prebuilt traveling forms help this contractor build a flat slab roof as well as a barrel-arch floor designed to overcome unstable soil conditions.

CONTINUOUS concrete barrel arches that hug the ground make a unique floor for the \$1-million Hill-crest Reservoir under construction in Denver. The arches rise only 1½ ft off the ground at the ends and 3½ ft at the crowns. To avoid a lot of intricate formwork in a limited space, Thomas Bate & Sons, general contractor, prebuilt forms that can be raised into place for concreting, then lowered and rolled ahead for the next pour.

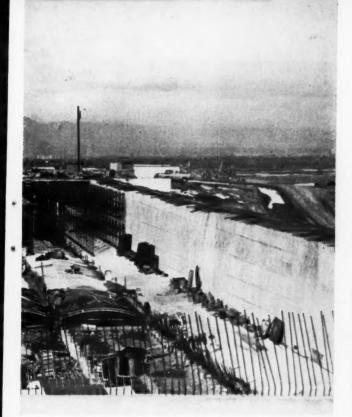
Ketchum, Konkel & Hastings, consulting engineers of Denver, designed the barrel-arch floor to cope with an unstable soil condition. After the excavation had been completed, engineers found that the soil swelled as much as 4-in. beyond its normal state when it became wet. As a result, they ruled out the originally proposed flat slab on grade and substituted 8-in.-thick concrete barrel arches supported by concrete-filled drilled footings.

Despite the design change, Bate was able to use nearly all the reinforcing steel specified for the original floor. This was fortunate because the steel had already been delivered to the site.

The barrel-arch floor supports 20 ft of water over the crown of each arch. The 380x553-ft reservoir, which has a 500-million gal capacity, is divided into two 190x553-ft basins by a concrete center wall. Flat-slab foundations for the outer and center walls extend 15 ft into each basin, leaving a width of 160 ft for each barrel-arch floor. (Wall foundations are cast on footings poured over 4-in. of Verticel, a cellular paper material that adjusts to the swelling of the soil. Engineers said this procedure would not have proved practical for casting the entire floor because it would have required spreading the Verticel 12 to 16 in. thick.)

#### Floor-Supporting Caisson

A total of 2,888 footings, or caissons, were drilled 17 to 30 ft deep for the reservoir. To support the barrel-arch floor, each basin has nine rows of footings that create eight 20-ft bays. The footings are at 5-ft centers in each row. Each footing bears on 5-ft centers in each row. Each footing bears on shale, is 2 ft in dia, and extends 1½ ft above the ground. To carry the floor forms, ¾-in. coil ties are inserted in opposite sides of each footing top before concreting. These coil ties are to support metal brackets that contain a steel roller and a pair of set screws—a part of the traveling formwork setup.



are no more than 3½ ft off the ground at the crown. In the background, workmen erect falsework and forms for flat-slab roof.

## a Vaulted Floor

20' OF WATER ABOVE & OF SHELL

The traveling arch floor forms were designed and fabricated specifically for the job by K-C Construction Supply Co. of Denver in consultation with Kris Nielsen, vice president of Bate. Each form measures 18x40 ft and consists of ¾-in. plywood sheeting that is bolted to the top chords of a series of steel trusses at 2-ft centers. The arch formed by the truss spans between rows of footings and has a 1 ft 10-in. rise. The top chord is made of two 1½x2x3/16-in. steel angles welded back to back. The bottom chord is made of two ½-in. reinforcing bars, the struts of ½-in. steel rounds, and sway bracing between trusses of %-in. rebars secured with J-bolts.

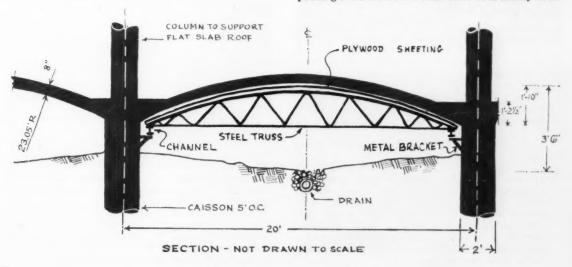
#### Rolling Formwork System

The ends of each truss rest on top of, and are bolted to, 5-in. steel channels that ride on the steel roller brackets affixed to the sides of the caissons. The forms are raised to their proper height for pouring, about 1½ in. above the rollers, by tightening the set screws against the channels with an air impact wrench. Three days after concreting, the set screws are released, and the forms are lowered until the channel rests on the rollers again. Then the forms are pulled ahead, either by a winch attached to a flat-bed truck or by a come-along.

Except for adjusting the set screws, this system leaves Bate with a minimum of intricate formwork. A workman moves under the forms to make adjustments by lying prone on a plywood board with casters that roll along two steel channels placed on the ground, web down.

Eight forms are erected across the width of each basin to create a 40x160-ft pouring section. To form between arches down each row of footings, Bate erects sectional 2x5-ft plywood panels that fit around the caissons. Workmen apply Knoxcrete coating to the forms, then lay the reinforcing web. Next, they place screed bars, a series of 1½-in. pipes bent to conform to the radius of the arch. Double holders support the screed at the crowns and standard chairs hold them along the low points.

A 35-ton Lima Paymaster crawler crane with a 60-ft boom and ¾-yd bucket handles most of the pouring from inside the reservoir. It is fed by tran-

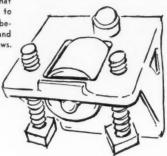


#### Roller Brackets Support Prebuilt Arch Forms



FORMS—Barrel arch is formed by ¾-in. plywood sheeting bolted to steel trusses. Workman must lie prone on dolly to get underneath.

ROLLER BRACKET — End of truss section (top) rests on 5-in. steel channel that rolls on bracket affixed to side of caisson. Bracket (below) has steel roller and two adjusting set screws.



#### CONCRETE RESERVOIR . . . continued

sit-mix trucks that also pull into the excavation. Equipment gains access down a 120-ft-wide dirt ramp left in one of the outside walls, and it moves between basins through a 60-ft gap left temporarily in the center wall.

Specifications call for concrete at 3,000 psi in 28 days

Bate devised an equally ingenious forming and falsework system for the 8½-in. flat slab roof. Like the barrel-arch floor forms, the roof forms are erected just once and then winched ahead as concreting proceeds.

#### **Hinged Roof Forms**

These forms, built in 20x140-ft sections, consist of ¾-in. plywood panels seated on 2x10-in. wood joists at 16-in. centers. The 20-ft width of each form is made up of a 10-ft section mounted on Time-Saver tubular steel scaffolding and two 5-ft leaves hinged at each side. The leaves can be raised into position to fit around column capitals, then dropped alongside the scaffolding to clear the columns so that falsework and forms can be winched ahead. Hinged connections are made with ½x4-in. bolts that pass through the joists of the leaves and the joists of the 10-ft sections.

The scaffolding is supported by the barrel arch floor. Each scaffold leg rests on a 4x6-in. skid. The skid fits inside a 4-in. channel that is connected by anchor bolts to the floor. After each pour, the form's leaves are dropped, the weight of the roof is taken off the scaffolding by lowering its legs with screw jacks, and the assembly is pulled ahead with a cable secured to the bottom of the scaffolding and attached to an air-powered winch.

The circular reinforced columns, 18 in. in dia, rise from the floor slab over each caisson. They are cast in standard sheetmetal forms supplied by Deslauriers Column Mold Co. of Chicago. Bate pours the column first, then the capitals. Next they raise the roof-form leaves and post them with adjustable shores to the reservoir floor. After they spread the reinforcing on the deck, they pour the roof across the full 190-ft-width of each basin in 140-ft-long sections.

#### Concrete Placement

Crews alternate between pouring a section of the floor and a section of the roof. Concreting for the roof slab lags about 160 ft behind the floor slab. For the roof slab, the Lima crane pulls out of the excavation to the rim of the reservoir and moves concrete from the transit-mix trucks to a hopper mounted on the edge of the roof. From there, Cmetco gasoline-powered buggies, manufactured by Creative Metals Corp. of Emeryville, Calif., carry concrete along runways to the pouring areas.

The first basin is nearing completion. Concreting in the other basin is about to begin.

Excavation work was subcontracted to the Horn Crane Service Co. of Denver. Two Worthington compressors, a 210-cfm and a 60-cfm, are on the job to operate jackhammers and tampers. The larger compressor also supplies air for the air-winch that moves the forms.

The reservoir, being built for the Denver Water Board, is scheduled for completion in Jan., 1961. Alexander Merciez is superintendent and Robert Schickell is engineer for Bate. Woodward-Clyde-Sherard of Denver are the soil engineers.



SCREED BAR—Workman sets chair to hold screed bar 8 in. over top of form. The bar is a 11/2-in. pipe bent to the radius of arch.



FLOOR POUR—Lima Paymaster crane works with %4-yd bucket to place concrete in one area while workmen finish concrete in another.

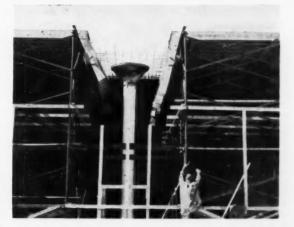
### Crews Complete Floor, Then Erect Roof Forms

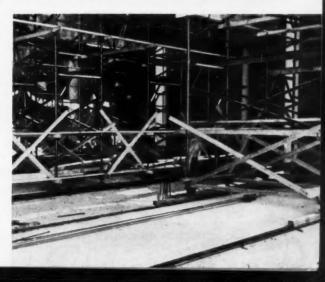
COLUMNS—First Bate pours columns, then they will raise leaves and post them from the reservoir floor with adjustable shores.



ROOF FORMS—These 20x140-ft-long sections have 5-ft hinged leaves at each side. Cutouts fit around column capitals when leaves are raised.

FALSEWORK—Time-Saver scaffolding supports roof forms. Tubular legs rest on skids that fit inside channels so assembly can be winched ahead.





By replacing the scarifiers of its big motor graders with sets of plowing disks, a Texas contracting outfit has come up with a versatile tool that handles many jobs at one time.



## Disks on Grader Aerate Fill



MODIFIED GRADER—No. 14 motor grader carries eight plowing disks instead of scarifier. Powerful rig replaces two separate machines formerly used for working fill. Chains take extra side thrust should the operator neglect to raise disks from fill when turning around.

TO HANDLE heavy, wet fill on a Texas highway job, Dallas contractor Condon-Cunningham Inc. has outfitted its graders with plowing disks. The hard-working rigs can mix the soil, aerate it, and blade it—all in one operation.

Condon-Cunningham is building 10½ mi of Interstate Route 287 near Wichita Falls under two separate contracts totaling \$4,-275,000. Scheduled for completion this year, the job calls for moving more than 1,700,000 yd of material.

To work a lot of the fill material, the contractor wanted a more efficient system than they began the job with—separately disking the fill with tractor-drawn plows and blading it with graders. What they came up with are three Caterpillar No. 14 motor graders with disks mounted in place of the scarifiers.

#### Simple Alteration

The alteration was worked out with the help of Darr Equipment Co., Cat dealer in Dallas. First

the scarifier was removed, leaving the lift arms and drawbar arms. A steel box frame was fabricated and the angle computed for attaching disks from an old towed plow.

Eight disks were attached, four on each side on a shaft carried by two bearings. The front mountings of the scarifier draft arms were modified slightly to allow free movement of the arms and to avoid stress of severe side pull in heavy material. The attachment can be removed in 20 to 30 min, permitting re-installation of the scarifier.

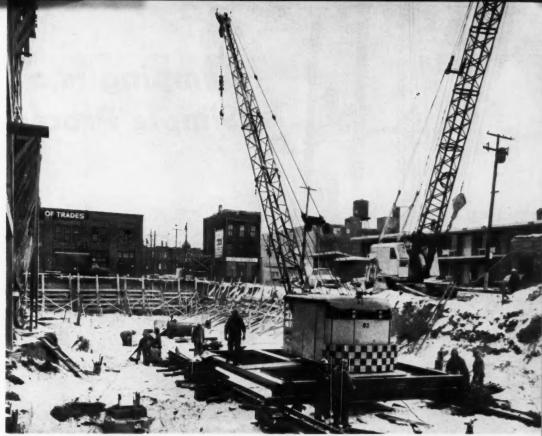
#### **Improved Operation**

Condon-Cunningham says that with the disk-carrying No. 14's they are working the fill just as fast as before, but only half as many machines are needed. The graders work in second gear (2.6 to 4.0 mph) with the disks cutting to a 6-in. depth. After the material is disked and bladed, an Essick vibrating roller pulled by an International H Farmall tractor compacts it.

#### Scraper Haul

Material for the fill is being hauled by three Caterpillar DW20's and three Euclid S-18's, with the units averaging 9,500 yd a day. In one 68-day period the scraper fleet moved a total of 700,000 yd. Other earthmoving equipment in the spread includes three Cat D9 and six D8 tractors and a No. 12 motor grader.

G. T. Hollingsworth is job superintendent for Condon-Cunningham.



GETTING STARTED—Crews set up cranes at basement level. Regular undercarriage of crane has been removed and replaced by a rail-mounted platform made of steel beams.

# Rail-Mounted Crane Erects Narrow Steel Building

To erect structural steel for a Detroit Post Office building, Bethlehem Steel Co. modified a truck crane to ride rails. The crane jumps itself two floors at a time.

TOO TALL for erection by a ground-based crane and too thin for guy derricks, a 10-story, 60x 192-ft administrative unit of the new Detroit Post Office building called for a special technique. Bethlehem Steel Co., who supplied, fabricated, and erected the project's 4,080 tons of structural steel, came up with one—a jumping crane.

They stripped the undercarriage from a 20-ton Lorain MC-414 truck crane and replaced it with a specially-built platform that rolled on ordinary track rails. The crane rolled back and forth on temporary track beams and rails laid down the center of the basement floor along the long dimension of the building to erect steel for the two floors above.

Then it jumped the track beams and rails to the second floor and erected additional steel in the jumping bay to support the lifting apparatus.

The crane was lifted to the second floor by four hoists set three floors above in the jumping bay. From here it erected two more floors and jumped two floors. The cycle was repeated until the work crew reached the eighth floor. From there they topped out the building. Then they dismantled the jumping crane, and a crawler crane on the ground lowered it to the ground.

#### Adapting the Crane

The first job was to prepare the 20-ton-capacity truck crane. Bethlehem took off the under-

carriage and bolted a speciallybuilt steel-beam frame to the crane's base ring casting. To this frame they added steel beams fitted with four steel wheels to form a grid platform.

The dimensions of the 9-ton platform were limited by the structure of the building. A typical bay is 22½x24 ft. Bethlehem made the platform 21½ ft square, and the track gage 19½ ft so it could be jumped in any bay except the end two.

#### Jumping Procedure

The crane was assembled on the ground at the basement level. It was equipped with a 60ft boom that could erect two stories for the full width of the building. On the eighth floor, a

LIFTING FRAME—Men attach lifting beams to the corner columns in the jumping bay.

HOISTS—Two load blocks are installed on each lifting beam. Wire rope falls consist of six parts. Lifting beams are 23-ft-long 10WF33 sections.

# Jumping Is a Simple Procedure



#### RAIL MOUNTED CRANE . . .

continued

20-ft jib was added to permit erection of the penthouse atop the 10th floor.

When the two floors of steel above the crane were in place, crews prepared to jump the crane. Ironworkers first erected four columns and two header beams in the next tier above the jumping bay to support the lifting beams.

Each lifting beam weighed 2,600 lb and actually was a double beam consisting of two 23½-ft-long 10WF33 sections. Each was equipped with the necessary plates and angles to hold the hoist assemblies. The beams were set on each side of the bay inside the column lines.

Two load blocks per beam were connected to the lifting hitches on the beams. The lower ends of the 6-part line, ½-in. wire rope falls were hooked on to four separate pick points at the corners of the platform.

The boom, locked at a 12-ft radius, was then positioned in a direction parallel to the long dimension of the building. Four 5-ton hoists, driven by air motors, raised the 12-ton rig evenly the two-floor distance. As a precaution against an interruption of



SECURING CRANE—Before tracks are installed and steel framing placed in jumping bay, the outriggers of the platform are set on blocks and wedged in place for safety.

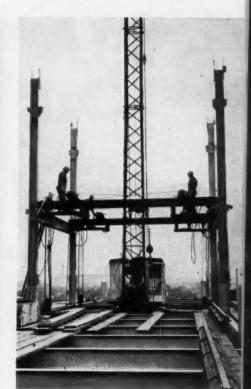
COMPLETING THE JUMPING BAY— Once crane pletform has been secured, crews complete the steel work under the crane. Next they install rails under platform.





FIRST JUMP-Lifting apparatus picks up crane platform by four corners. Four 5-ton





NEW LEVEL-Crane has been lifted two floors. With boom up, rig just fits opening.

the air supply, hand cranks were on hand so the hoists could have been operated by manpower.

#### Traveling

The rig moved horizontally along two 70-lb rails mounted on 10BP57 beams spaced 191/2 ft on centers. The beams were shipped to the site in six 24-ft lengths with the rail attached by hook

The rails were fitted with splice bars and the beams with splice plates so bolted connections could be made quickly in the field. With all the sections in place, the work path for the crane was 72 ft long.

The track runway was leapfrogged as required as the crane moved along the 192-ft length of the building. Generally, the crane worked from three separate positions at each level.

#### Removing the Crane

On the eighth floor, the crane completed the erection except for the center and street panels in the dismantling bay. Workmen raised the platform with a strut,

TWO CRANES-As jumping crane rises to a new operating level, a crawler crane on the ground transfers steel from delivery trucks to within reach of erection crane.

REMOVING THE CRANE—Crawler crane with 130-ft boom lowers the superstructure of jumping crane, whose boom is on ground.

#### RAIL MOUNTED CRANE ...

continued

made up of four plates, on one of the platform beams and turned the wheels and track 90 deg.

They moved the crane laterally to the center of the last bay. From here, it completed the erection of the center panel

Then they removed the boom and counterweight and winched the rig to the edge of the building. The crawler crane in the street removed the jumping crane, platform, and track assembly in convenient sections. Then it completed the erection of the street-side bay. Finally, with its boom shortened to 100 ft (from 130 ft) and the jib shortened to 20 ft, removed tools and equipment from the sixth and eighth floors.

Bethlehem did the steel work for Barton-Malow Co. of Detroit, who are general contractors for the project.

## Crane on Ground Lowers Jumping Crane



REMOVING THE FRAME—Carrying-frame for jumping crane is removed from building. Ground crane now will complete final bay.



ROCK CUTS—Drill rig prepares blast hole high on one of the rock ridges that cross road site. Parallel railway line was a continual problem to the blasting operations.

## **Blasting Pro Tackles Road Job**

When this drilling and blasting outfit decided to take on general roadbuilding contracts, they started with a rock job where their experience is really paying off.

A BIG COMPLAINT of roadbuilders today is the destructive bidding by small, new contractors who bid jobs below cost in the hope of getting started in the industry. So it's refreshing occasionally to hear about a new roadbuilder who is entering the field as a solid, experienced pro rather than an unpredictable speculator.

Rowe Contracting Co. of Malden, Mass., made this sort of debut last summer when they bid as a prime contractor and won the contract for a 1½-mi stretch of new Interstate Route 89 in Middlesex, Vt. Their new role as a prime contractor isn't going to ease the fierce competition in the roadbuilding industry. But Rowe is not type of company to dam-

age the industry with self-defeating, below-cost bidding.

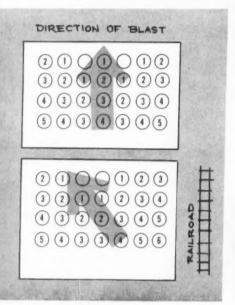
Actually the Rowe organization is no stranger to roadbuilding. They've been in the business since 1898. For some years now they have specialized in drilling and blasting. In this field they have pioneered new methods and types of equipment. They operate several permanent quarries and have handled drilling and blasting on highway jobs as a subcontractor.

#### On Their Own

Last year they decided to expand their operations to handle prime contracts for roadbuilding. They picked their first job carefully to give it every chance of being successful.

To start with, they figured that with their blasting experience they could compete best on a predominately rock job. Section 4 of the Vermont interstate project, which calls for 300,000 cu yd of rock excavation and only 200,000 yd of earth, seemed to be a natural for them.

They made another smart strategy move when they entered into an informal arrangement with a Vermont contractor to share skills. Burnett & Campbell, Inc., of Burlington, have done considerable road work in Vermont, but the Interstate 89 project was a little bigger than the contracts they normally handle. They bid Section 3, the one adjacent to Rowe's, and got the contract. Sec-



DRILL PATTERNS—For normal cuts, Rowe uses symmetrical pattern (above). Other throws rock away from railway.

tion 3 is mainly earthmoving (280,000 cu yd of earth against 140,000 cu yd of rock).

Having obtained adjacent sections of the project, the two contractors arranged to co-operate on the work. Rowe handles the rock excavation for both jobs, working as a subcontractor for Burnett & Campbell on their job. Burnett and Campbell lay the subbase for Rowe.

It's not a formal joint venture, but it has the same effect. Two contractors pooled their specialized talents to handle a big job that neither wanted to tackle alone at this stage in their development.

Rowe was awarded the contract for Section 4 in March, 1959. Their bid of \$1,816,000 was the lowest by \$16,000. They expect to finish the job, including paving (which they will subcontract), by December of this year.

#### **Blasting Problems**

The rock cuts on the Vermont job posed some interesting challenges even for a contractor of Rowe's experience. They had to experiment a little before they arrived at the most efficient methods of handling the rock.

The biggest single problem is a Central Vermont Railroad line that is parallel to the line of the



DRILL RIGS—Four of the six rigs Rowe has on job prepare the drill holes for a big rock cut. The crawler-mounted rigs can adapt themselves to handle drilling on any part of the rugged job site.

new road and about 200 ft away from the centerline. Because Route 89 will be a four-lane divided highway (through parallel cuts in the rock sections) its right-of-way is wide, and in the deeper cuts, the 200-ft margin is almost all occupied.

The proximity of the railroad limits Rowe to shots of about 6,000 lb maximum. On one side-hill cut, Rowe reduced the size of shot and also left a protective 10-ft wide rock wall on the railroad side of the road during the main shots. Later they removed the rock barrier with smaller shots.

On the half of the road nearest the railway, Rowe uses a pattern of millisecond delays designed to throw the shattered rock slightly away from the railway and backward in the cut. On the other half of the road, they use a symmetrical pattern that throws the force of the blast directly backward.

Almost more of a problem than the railroad itself are the overhead wires that run beside it. While a stray rock or two can easily be removed from the track, cutting the wires is a more troublesome event. Fortunately, it happens very rarely.

An existing road, Route 2, is about an equal distance away on the other side of the new route. It is less of a problem because road traffic always is stopped during a blast, and any debris that does fall on the road is easily removed. Still, it is a limitation because Rowe can't interfere too much with road traffic.

#### Soft Rock

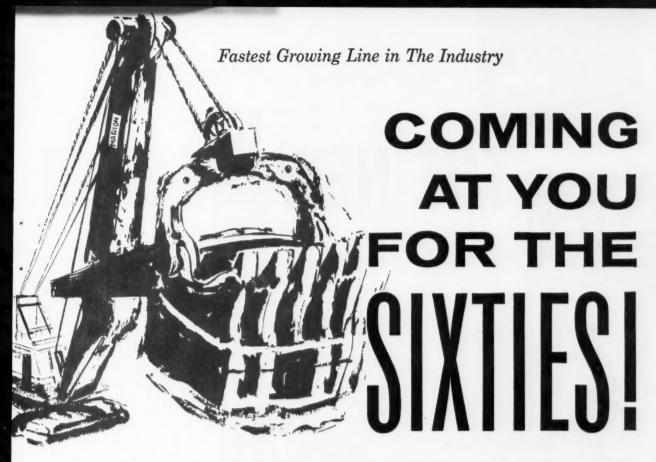
The rock is soft, porous, and "dead" in the sense that it is hard to move out of place by blasting. Rowe started with a mixture of 75% ammonium nitrate and 25% dynamite in the holes, but this mix wasn't moving the rock properly. They switched to a 50-50 ratio to get more punch into the shots. The dynamite is 40% Giant Gelatin.

The porous rock seems to require more explosive than usual. Rowe puts in about 1¼ lb of exposive per cu yd of rock excavated, which is more than they would like to be using.

The drill hole pattern is about 60 ft wide, the width of one half of the dual-lane road. Holes are 3½ or 4 in. dia, spaced 10 ft apart with a 9-ft burden. Depth varies up to 75 ft.

Rowe started the job with a 6-in. Ingersoll-Rand Drillmaster but they found it was too big to handle easily in the extremely rugged terrain they encountered.

continued on page 98



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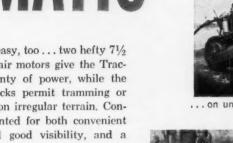
The Trac-Newmatic carries a big 5-inch drifter on an extra-sturdy air-powered feed shell...all mounted on a hard-lugging crawler that can pull a 600 rotary along with it over rough terrain.

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... or over-the-tracks





FILL—Euclid end-dump hauls broken rock to fill area of road. Rowe shatters rock sufficiently so that it makes good fill. Earthwork is balanced when rock fill is used.



CUT—Drill rig prepares holes for secondary blasting in one of the cuts. Vermont specifications call for loosening rock 4 ft below normal to provide excellent drainage layer.



COMPRESSORS—Row of compressors provide excellent air power for drills high up on cut.
Rowe has three Ingersoll-Rand and four Chicago Pneumatic 600-cfm compressors on the job.

They have moved it to the quarry they operate 40 mi away to supply graded rock for the subbase.

Now they have on the job six smaller rigs that can adjust tracks and masts to work on almost any slope. Three Gardner-Denver Air Tracs and a Joy T450 mount 3½-in. drills. Two Joy T500 Challengers mount 4-in. drills. At the present rate of drilling, Rowe gets about two shots per week.

Three Ingersoll-Rand and four Chicago Pneumatic 600-cfm compressors power the drills.

An unusual feature of the job is a drainage experiment that the Vermont Highway Department is conducting. The contractor blasts rock to a depth 4 ft below normal but does not remove the shattered rock. The intention is that this layer will provide drainage under the road.

#### Earthmoving

The route contains a series of rock ribs that cross the road with low-lying pockets of earth between them. The earthwork is pretty well balanced provided rock from the cuts is used as fill. Rowe breaks up the rock sufficiently so that it makes good fill.

To haul it, they invested in a fleet of new earthmoving equipment. Two 2-yd Bucyrus-Erie 51-B shovels load the blasted rock into seven 15-yd Eucs. A Cat D9 dozer works on the fill.

The weather gave earthmoving operations a good break early this spring. A week of almost continuous rain and mild weather in March got rid of the snow and frost very quickly. It was a stunning blow to the skiers who disconsolately slushed around Stowe and other nearby ski areas for a few days before giving up. But it was a good thing for the roadbuilders because the frost came out of the ground quickly, even though working conditions were pretty bad during the one week that it happened.

A big part of the Rowe contract was to relocate about a mile of the existing Route 2. They finished that last year. They expect to finish blasting for the new road in June and complete paving in the fall.

For Rowe, Jim McNulty is project manager, Carol Thomas is superintendent, and Rod MacLellan is in charge of drilling and blasting.

## Avoid these problems...

Too Much Construction Work?

Crews Needed for Other Jobs?

Projects to be Handled Quickly?

Assuring Profit on Unfamiliar Jobs?

Hiring Additional Crews?

Impending Completion Deadlines?

Equipment Tied Up?

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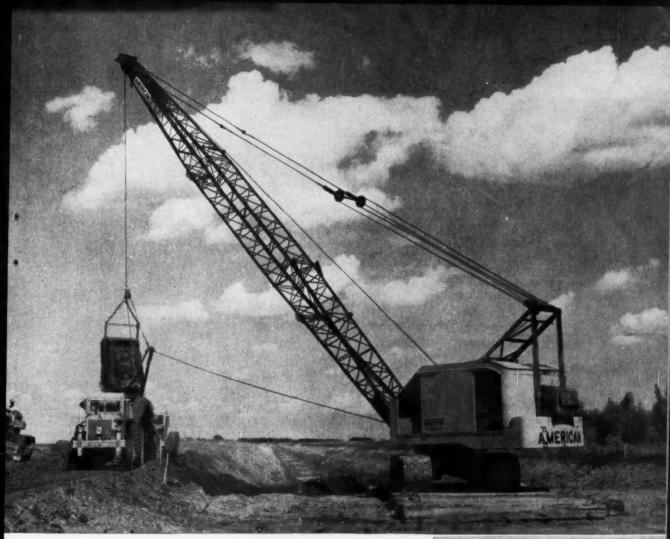
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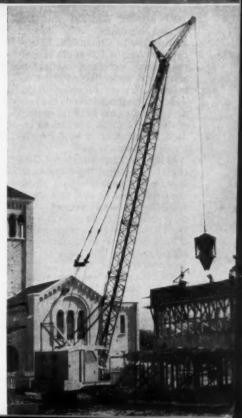
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STARTING THE CAISSON—Two L-W scrapers excavate 20 ft of caisson hole.

Wellpoints, interior floating pumps, and a system of deep wells were necessary to keep the excavation dry during the sinking of a 110-ft-deep caisson.



ASSEMBLING THE CUTTING EDGE—A crane places the heavy steel caisson cutting edge in sections. The entire assembly weighs about 100 tons.

## **Three Dewatering Systems Keep**

TOO MUCH WATER was the biggest headache on a caisson sinking job in Cincinnati. As excavation for the 100-ft-ID caisson progressed, excessive infiltration of ground water forced the contractor to try several different dewatering methods to keep the hole dry. Finally, an unusual system of deep wells was devised to reduce the amount of water seeping into the caisson.

Foley Construction Co. of Cincinnati is building the caisson and driving an intake tunnel under the Ohio River as part of a water works expansion project. The caisson is 110 ft deep with 5-ft-thick reinforced concrete walls; it will serve as an underground intake reservoir for a low service pumping station.

The bottom of the caisson is founded about 2 to 5 ft deep in bedrock. Above that, the soil consists of sandy silt that in itself presented no problems to caisson sinking, but it did allow ground water to flow freely.

Below the caisson is an intake

tunnel driven in rock. The tunnel is 65 ft below the bottom of the caisson and is connected to it by a vertical shaft. Both shaft and tunnel have an ID of 10 ft. Discharge lines from the reservoir are near the surface of the ground and are founded on piles.

Work on the caisson itself progressed in several stages involving repetitions of excavation, concrete work, and dewatering.

#### At the Start

To speed excavation near the ground surface, Foley brought in a pair of LeTourneau-Westinghouse scrapers and an Allis-Chalmers push tractor. These rigs dug a circular hole about 20 ft deep. The caisson cutting edge was installed in the bottom of this hole on a heavy ring mat constructed of 4x10-in. timbers salvaged from an old bridge that Foley had demolished.

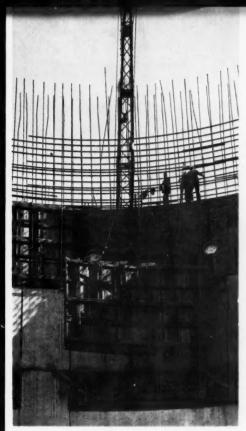
Because of the large diameter, the cutting edge was fabricated in sections and assembled at the job site. The edge is 11 in. wide at the bottom and increases to 5 ft at the top. About 100 tons of steel went into the cutting edge. Its upper inner rim was shored to the timber supporting mat by 4x6-in. timbers on 8-ft centers.

Once the cutting edge was in place, carpenters went to work forming the wall. All forms were built by Foley, either in their main shop or at the job site. The curved forms consist of a light steel frame faced with plywood panels or vertical boards. A pair of Lima crawler cranes handled the forms, the reinforcing, and the concrete.

Concrete pouring proceeded in 12-ft lifts. Each lift, in turn, was divided into quadrant pours. Pairs of diagonally opposite quadrants were completed simultaneously to eliminate differential settlement along the wall.

No dewatering of any kind was necessary for this stage of the work

After the wall had been poured 40 ft high, Foley began to sink the caisson. This was done by excavating from within it with a



BUILDING THE WALL—Work crews strip wall forms from a completed 12-ft lift.

## **Caisson Dry**

70-ton Lima crawler crane working from the rim of the hole. Inside the caisson, an Allis-Chalmers HD-11 tractor shovel loaded 5-yd skips handled by the crane.

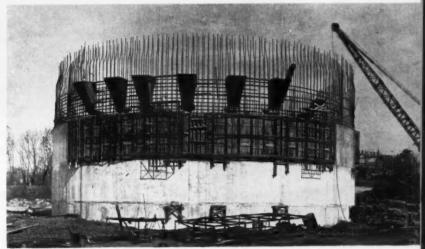
Shoring along the caisson cutting edge and the timber mat under it had to be removed so the caisson would sink as the excavation progressed. At first, Foley had figured that removing the shores would concentrate the weight of the wall on the 11-in.wide cutting edge, causing it to cut the timber mat. To release the weight uniformly along the wall, the timber shores were removed by blasting. Much to everyone's surprise, the caisson settled only 3 in. and did not cut the timber mat. So the tractor shovel in the caisson had to pull the mat timbers out from under the cutting edge.

#### **Ground Water**

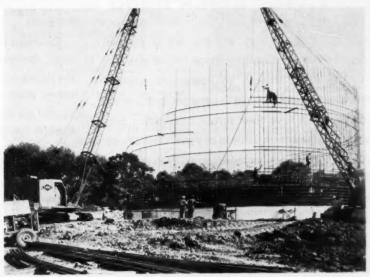
When the caisson was sunk to about 30 ft, ground water started seeping into the hole, and de-



FORMWORK—Carpenters cover the surface of the curved forms with new sheets of plywood. All forms were built by Foley's own men.



CONCRETING—Chutes along the wall receive concrete delivered by crane. Elephant trunks distribute the concrete inside the forms.



REINFORCING—Cranes have to place each rebar individually because the 21/4-in.-dia steel is too heavy to be handled by the ironworkers.



## SANDVIK COROMANT

## bits and steels

### ...for quick hand uncoupling!

No, it's not child's play, but the fact is you can uncouple Sandvik Coromant Rope-Thread bits and steels by hand! Smooth, shallow-depth, rounded threads with a pitch of just 2 turns per inch prevent binding. You'll have fewer thread failures too, compared with "saw-tooth" thread designs. What's more, only the threads are hardened, so you can re-thread steel sections without heat-treating. And, with faster uncoupling, you'll drill more feet per shift!

Coromant bits and steels have many other advantages, too: Better quality carbide (Sandvik is one of the largest manufacturers of carbide in the world)... better, more rigid steel...superior workmanship... all add up to above-average bit and rod life, up to double the footage between sharpenings, and straighter, cleaner holes.

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THREE DEWATERING SYSTEMS . . . continued

BOTTOM OF THE HOLE—Crews excavate a portion of the center intake shaft to serve as a sump. Ditches in the bottom of the hole drain all water to the sump which is pumped out whenever needed.

watering became necessary. A Moretrench wellpoint system was installed to lower ground water and keep the caisson dry.

Excavation then was continued until the entire 40-ft section of the wall was sunk into the ground. At that time the remaining 70-ft portion of the caisson wall was formed and poured.

Then caisson sinking was continued. But water was seeping in faster than the wellpoint system could handle it, and the contractor had to take the tractor shovel out of the hole and continue excavating through the water with a 3-yd clamshell.

Additional pumping equipment was put into operation to keep the depth of the water to a minimum and improve the efficiency of the clamshell work. Two 5-in. Weinman pumps with a combined capacity of about 3,000 gpm were brought to the job. Each pump floated inside the caisson on a raft of 16 empty barrels.

The pumps kept the water level low enough so the clamshell could continue the excavation and sink the caisson to within 10 ft of bedrock. At about that point water depth was too great for effective clamshell work, and a new dewatering scheme was devised.

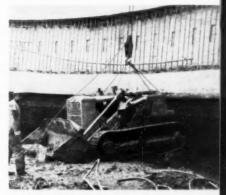
#### Deep Wells

The wellpoint system was abandoned, and six 12-in.-dia wells extending nearly to bedrock were installed around the caisson. Five of the wells were equipped with 10-hp deep-well pumps, and the sixth had a 25-hp unit. Their combined capacity was about 400 gpm.

Combined with the two Weinman pumps inside the caisson, the well system kept the excavation fairly dry. The Allis-Chalmers tractor shovel was again lowered into the hole, and the digging was continued the rest of the way to bedrock.

Installing the wells was a project in itself. The system was designed in cooperation with the Moretrench Corp. Each of the wells was about 102 ft deep. The 12-in. pipe casing for each well was installed in one piece by jetting. But the boom on the Lima 802 crane was only 105-ft long -not enough to lift the pipe into vertical position. Digging a 15ft-deep hole at each of the well locations beat this little problem, and the crew was able to handle the pipe without alterations to the crane.

To install a well, a 5-in. jet



MECHANICAL DIGGER—Allis-Chalmers loader is set in caisson to muck it out.

pipe was inserted into the 12-in. casing. When the well pipe got stuck or hit a hard layer of soil, the jet was moved up and down like a wellpoint holepuncher to dislodge the obstruction. A dieselpowered pump supplied jetting water, sucking it from within the caisson. It took about 8 hr to set up the equipment and to sink one of the wells. The jetting itself took as little as 3 hr.

Even with the deep wells operating at capacity, water was seeping into the caisson at a fairly

continued on page 108



## the most popular performer on the

road

There's a big difference between run-of-the-mill acting and star performance. And that's why the Cedarapids Bituminous Paver is the most popular performer on the road! Owners say so . . . they're the ones who like the Paver's profit-making role. Job superintendents say so . . . they're the ones responsible for the results of Paver performance. Operators say so . . . and they're the ones with first hand information about the performance of the machines they run.

Join the ranks of the hundreds of paving contractors whose enthusiasm for the on-the-job performance of Cedarapids Pavers makes them the most popular stars on the road today.

#### JEANNE CRAIN IS SITTING PRETTY

on this Cedarapids Bituminous Paver while she describes the allautomatic controls to Miss State University of Iowa. The popular TV and movie star knows more about acting than she does about machinery, but she certainly knows about popularity. When a machine becomes as popular as this Cedarapids Paver, you can be sure its performance is "way above average."



### why is the cedarapids paver so popular?

IT'S FAST



Operating speeds up to 102 feet per minute get the job done quicker and at less cost. You can handle more jobs per season.

IT LAYS PERFECT MAT



The vibrating screed "irons" the mix into a smooth, uniform, high density mat with no voids or tears, even at 102 fpm. The Cedarapids Paver saves time and money . . . there's little need to go over rough spots. Takes less rolling, too.

#### MAINTENANCE IS EXTREMELY LOW

1/3 fewer wearing parts than on other pavers cut maintenance requirements and costs. Less downtime means more work time per season. You can bid confidently

on the tightest paving schedules.

IT'S EASY TO OPERATE

"It's an operator's paradise," say the men in the driver's seat. The few simple electric controls make the Cedarapids Bituminous Paver so automatic it almost operates itself.





"Fastest Paver alive! Its precision performance is far beyond our expectations."



Contractor

"It's the best machine I've ever used."



"We like the speed and mat-laying qualities of the Paver, and also the design of our Cedarapids Bituminous Mixing Plant."

Canadian

COMPLETE YOUR PAVING PICTURE
WITH A CEDARAPIDS MIXING PLANT

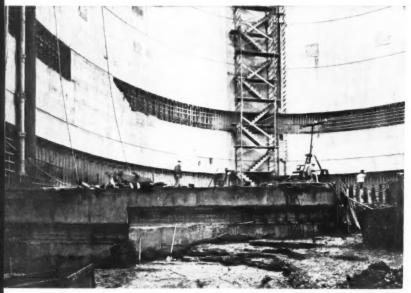
Here's the way to supply your Paver with lowest cost mix. Use the Cedarapids Bituminous Mixing Plant model best suited to your production needs. The complete line includes portable or stack-up batch-type models with all-automatic, semi-automatic and manual controls, in 1500 lb. to 7500 lb. batch sizes. Two sizes of continuous mix plants also available.



#### MANUFACTURING COMPANY IOWA CEDAR RAPIDS, IOWA INS. 16 Printed in U.S.A. IOWA MANUFACTURING CO. Your ticket Gentlemen: Please show me how to get a front row seat at the profit show! Send details about Cedarapids ☐ Bituminous Mixing Plants ☐ Bituminous Pavers ☐ Aggregate Plants Name Company. Address. State. City.



FINISHING THE BOTTOM—After pouring a concrete sub-lining for a 10-ft section of the center shaft, the crews prepare the caisson floor for a 9-ft-thick fill slab.



FILL SLAB—The fill slab on top of the bedrock is poured a quadrant at a time. The construction joint is offset to accommodate the sloped rock.

high rate, but the two Weinman pumps could handle this easily.

A short in the electrical system during one weekend took the pumps out of commission, and the caisson filled up with water. It took about 40 hr of pumping before work could resume.

The excavation was continued about 2 to 5 ft into bedrock. Sinking the caisson the final few feet into the rock required drilling and blasting under the cutting

edge, but no special problems were encountered.

#### Finishing the Bottom

When the bottom of the excavation reached the proper grade, the crews sank about 10 ft of the permanent center shaft and poured a sub-lining to keep the hole clean. They also cut two trenches or troughs from the center hole to the wall. The trenches sloped toward the center, and together

with the hole served as a drainage system and catch basin for the water seeping into the caisson. The center hole was pumped out periodically to keep the bottom of the caisson dry.

At this time the contractor also installed a piping system to relieve ground water pressure and to keep the caisson from floating after the bottom was poured. This system consisted of an 8-in.-dia corrugated metal pipe laid in a circular bed of gravel about halfway between the center and the wall. Vertical relief pipes, 4 in. in dia, were then connected to the corrugated pipe every 20 ft. The relief pipes were long enough to extend through the concrete floor of the reservoir.

Pouring a fill slab on the rock bottom was the next operation. This slab contained no reinforcing and had an average thickness of about 9 ft. The thickness varies because the bedrock is sloped. The fill slab was poured in four sections, each covering one quadrant. Concreting the fill slab went on at the rate of 50 cu yd per hr and required about 3,000 cu yd of concrete.

A reinforced concrete floor rests directly on top of the fill slab. This also is 9 ft thick. The reinforcing is some of the heaviest ever used in the Cincinnati area: The bars are 2½ in. in dia and most of them were welded in po-

continued on page 112



### NO. 12 MOVES FLEXIBLE BASE FAST -UP TO 3800 CU. YD./10 HR. DAY

The No. 12 pictured above is one of 4 Cat Motor Graders working on an Interstate Highway improvement contract being handled by T. L. James & Co., Inc. and R. W. McKinney of Corsicana, Texas. The 7-mile paving job is near Richmond, Texas, and calls for 62,178 cu. yd. of concrete plus 98,740 cu. yd. of gravel and 95,420 cu. yd. of flexible base.

To keep production high and on schedule, these contractors rely on the No. 12's superior performance and operating efficiency to move flexible base fast. Equipped with a 14-ft. blade, this unit spreads 3600 to 3800 cu. yd. per 10 hr. day.

This is the kind of production and dependability you can expect from the 115 HP Cat No. 12...now, more than ever, with the many improvements incorporated in the *new* Series E model.

The most notable improvement is the new compact engine which provides greater lugging ability in tough going, long life and easier servicing. Horsepower remains the same (115) but this new engine develops higher torque and gives the No. 12 greater load-handling capacity. Besides a new compact engine, the No. 12 Motor Grader now has the dry-type air cleaner as standard. Removing 99.8% of all dirt from intake air this cleaner can be serviced in 5 minutes...cuts maintenance time by as much as 70% and substantially reduces cost... extends engine life.

Still retained are the many important features that have made the No. 12 the leader in its class. There's the oil clutch, providing up to 2000 hours without adjustment... the equivalent to 12 months of operation. Ample clearance between the top of the moldboard and the bottom of the circle drawbar provides greater rolling action... allows more material to move across the blade. Improved mechanical controls make engagement easier. Blade controls have a mechanical lock to insure positive blade position. When control is in neutral, the power shaft is locked by a set of gear teeth to prevent creeping.

These are just a few of the reasons why the NEW Cat No. 12E Motor Grader is out front. To get the complete picture, see your Caterpillar Dealer. He'll show you proof of top performance with an on-the-job demonstration!

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

### CATERPILLAR



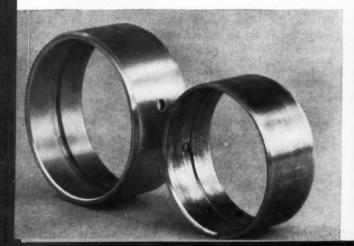
# An amazing metal up to 3 times



"Silver circles" as hard as Swedish steel make your Onan Plant last longer.

**Big, brawny bearings**—twice the size of many competitors' bearings—give Onan Plants a longer life between overhauls. Onan is built *up* to performance, not down to a price.

To give you greater assurance of top performance, inspectors from an independent laboratory periodically visit our factories to test units and production testing methods.





# gives <u>Onan</u> engines the Valve life!

Onan exhaust valves and seats are coated with Stellite, a tough alloy, to greatly reduce wear and burning

Stellite—one of the toughest alloys known—gives the exhaust valves and seats in an Onan engine up to 300% longer life. Scorching punishment—Stellite can take it.

Onan's attention to important details, like valves and valve seats, is what makes Onan Plants so dependable, so long-lasting, so economical.

And, only Onan gives you Performance Certified. Every Onan Electric Plant is run for hours under full load before it leaves our factory to assure ourselves, and you, of getting all the performance and power you paid for. To give you even more assurance, inspectors from an independent laboratory come in periodically to double check our tests and testing methods. Whether you need primary or stand-by generating power, from 500 watts to 230,000 watts, see your Onan distributor. You'll find his name in the telephone classified section in every major city, or write direct.

#### ONLY ONAN GIVES YOU THIS GUARANTEE



D. W. ONAN & SONS INC., 2592 UNIVERSITY AVE. S.E., MINNEAPOLIS 14, MINN.

### THREE DEWATERING SYSTEMS . . .

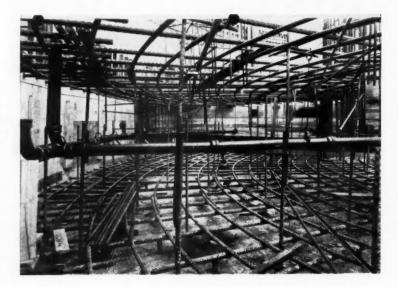
continued from page 108

FLOOR REINFORCING—Steel for the top and bottom of the 9-ft-thick caisson floor is installed above the unreinforced fill slab. Utility pipes will be imbedded in the floor.

sition. Truscon Div. of Republic Steel Corp. fabricated the reinforcing. The walls also contain the same size steel. A total of 4½ million lb of reinforcing went into the caisson.

All concrete was made at the job site. Foley set up a portable Heltzel batch plant to produce the more than 15,000 cu yd of concrete for the caisson. Most of the concrete was a 6.2-sack mix.

A maximum placing temperature of 70 deg was specified for concreting. This was hard to meet sometimes because most of the concrete work was in progress during the hot summer months. But here's where the excess ground water served a useful purpose. Foley used the water from the dewatering wells to cool the aggregate and to make the concrete. The well water was at a temperature of 55 deg, considerably reducing the concrete temperature. In spite of this, they



frequently had to resort to night placing during the hot season.

The floor slab was poured to within 2 ft 9 in. of the caisson wall, and the ends of the floor reinforcing remained exposed and overlapped the ends of U-bars in a construction joint in the wall. After pouring all but the outer edge of the floor, the contractor had to allow 96 hr for shrinkage. At the end of that period, the floor and wall reinforcing was welded together and the construction joint was concreted.

Before completion of the floor, grout was pumped into the soil around the bottom of the caisson to seal off infiltration. It took five days of continuous three-shift operation to complete this job. The grout pump maintained 30-lb pressure, and the grout was pumped through pipes fabricated into the caisson cutting edge on 8-ft centers. Grouting reduced infiltration to about 30 gpm.

Then the drainage sump was no needed and tunneling longer deepening the crews started center shaft and driving the tunnel under the Ohio River. Foley started the project in the spring of 1959, and the tunnelers began their part of the job in September. Foley's contract involves only the underground portions of the pumping station and is scheduled for completion this year. Currently they are installing interior baffles, floors, and discharge lines.

#### Men on the Job

General superintendent for Foley Construction Co. is Louis E. "Gus" Dauner. Jack Janson is asisstant superintendent on the caisson job. Consulting engineers for the City of Cincinnati are Black & Veatch of Kansas City. Their job engineer is Martin Hemker.

CAISSON INTERIOR — Ironworkers and carpenters install reinforcing and forms for intake shafts, baffles, and second floor after the caisson walls and floor are completed.

Page 112—CONSTRUCTION METHODS and Equipment—June 1960

### RUGGED ROCK SHOVEL

### FAST CYCLE DRAGLINE



Stripping a hill of rock, the "85-A" shovel combines powerful crowding action with smooth swings, loads out trucks fast. Dipper stick made of "T-1" steel. Air dipper trip for fast dump cycles.

Long reach of this 70-ft. boom speeds work as this "85-A" dragline dredges out a pond. Lorain's exclusive Square-Tubular-Chord boom is lighter and stronger, provides longer reaches, bigger capacities.

### CONVERTIBILITY MEANS WORKABILITY WITH A LORAIN 85-A

Many rigs are convertible in name only. When it comes to on-the-job performance they show up as one-purpose machines.

Not the 2½-yard Lorain 85-A. It converts so easily that field changes are a breeze. On the job, it has the power and control to pay off on all kinds of work. Everything from tough shovel and hoe digging to dragline, clamshell or crane operations.

The "85-A" gets its versatility from its design. There are three power shafts for simultaneous hoist, swing and

travel... two-lever "Joy-Stick" air power controls that blend operations for faster shovel-crane cycles. There's warranted "Shear-Ball" connection for rock steady swings, minimum maintenance... and a two-speed crawler with independent travel and air ease controls. Plus many others.

If you are looking for a heavy-duty rig that will boost your output and widen your workability, ask your Lorain distributor about the 85-A.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

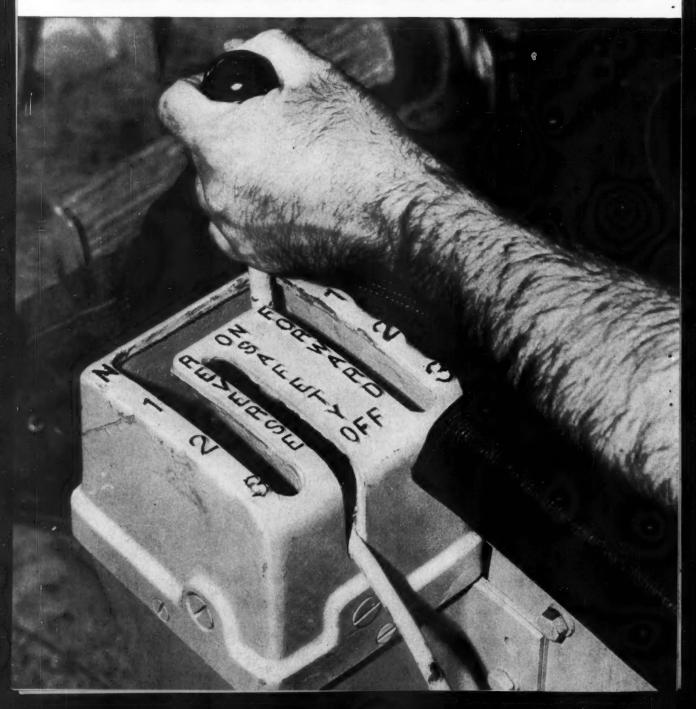
### LORAIN. ON THE MOVE

PLANTS: In Lorain, Elyria and Bucyrus, Ohio . . . PRODUCTS: Power shovels, cranes, draglines, clamshells, and hoes on crawlers from %- to 2½-yard capacity • Cranes from 7 to 80 tons . . . on crawlers, and as rubber-tire Moto-Cranes, and Self-Propelled Cranes • Rubber tire front-end Moto-Loaders in 6000-lb. and 7000-lb. carrying capacity . . . OUTLETS: Lorain products sold and serviced by 249 distributor outlets throughout the world.

### 33-50% MORE

New Cat D9E Tractors with pay their own way with

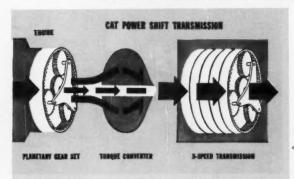
ONE LEVER DOES IT ALL!



### PRODUCTION!

## full power shift transmissions outstanding performance

- Shifts on-the-go under full load in a split second!
- Changes to all speed ranges, reverses direction!
- One control lever-and no braking or clutching!



Basic design: Total power is transmitted from the engine to a planetary gear arrangement mounted on the engine flywheel. A torque divider directs the total power—part through a direct drive shaft straight to the transmission and the remainder through a torque converter to the transmission. This enables the Cat power shift transmission to combine the economy and quick response of direct drive with the anti-stall and acceleration against load of torque converter drive. Unit construction makes it easy to service, if required. It's tough—one rugged ton built with the precision of a fine watch.



50% more production! D9E, owned by Carmichael Coal Co. near Calumet, Alabama, removes overburden of shale, sandstone and clay to uncover 30" coal seam. Coal production is 9000 tons a month.



33% more production! Overburden, running to 60', is blasted and then cleared by a DE. Owner: McCoy Coal Company, Gorgas, Alabama. 1,800,000 yards is moved to mine 150,000 tons of coal per year.

Trading in another large track-type machine for a Caterpillar D9E Tractor has brought big production increases to two strip mine operators—increases that prove these power shift machines are quickly paying for themselves on the very tough jobs found in overburden removal.

"We're getting half again as much production with no additional cost," says F. M. Carmichael, part owner of Carmichael Coal Co. near Calumet, Ala. "Power shift cuts operator fatigue and increases the maneuverability of the tractor." That's exactly the reason for designing a Caterpillar transmission with a one-hand control which shifts into all speed ranges, forward or reverse and onthe-go, without braking, and without a master clutch.

Earl McCoy, owner of the McCoy Coal Company, Gorgas, Alabama, has had nearly as good results. "We're getting 331/3% more production with the D9E over the machine we traded in...it's more economical to operate."

The D9E, like all Caterpillar track-type Tractors, has lifetime lubricated track rollers (with the exclusive patented floating ring seals) that never need servicing. Also a dollar-saving dry-type air cleaner that can be serviced in just five minutes, yet filters the air 99.8% clean even in the worst dust conditions. And shifting is so easy the operator just naturally gets more work out of the tractor. What's more, he gets it on the toughest, most demanding jobs.

Besides power shift transmission, you have your choice of direct drive or torque converter in both the 335 HP D9E and the 235 HP D8H Tractors. For complete details on the new power shift transmission, see your Caterpillar Dealer. He's ready to show how it works...demonstrate ruggedness under complete, easy one-hand control!

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.







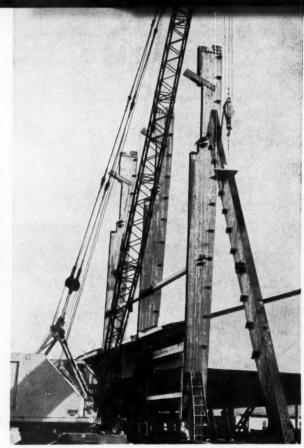
THE MATERIALS—Workmen prepare one of the glued laminated columns for treating.

was an easy job because all structural members are made of wood and were light enough to be handled by a single 25-ton truck crane.

The 103-ft-long bowstring roof trusses were completely assembled at the job site and erected in one piece. All columns and top and bottom truss chords are laminated wood.



THE BUILDING—Bowstring trusses span full width of the 103x468-ft storage shed.



COLUMN ERECTION—American truck crane simply picks up each 56-ft tapered column and lifts it into position along the wall.

### All-Wood

A SINGLE TRUCK CRANE handled all erection for a big lumber storage shed in Crossett, Ark. The shed encloses 48,200 sq ft of floor space and is one of the largest all-wood industrial buildings ever built.

The storage shed is part of a \$1-million expansion and modernization program at the Crossett Lumber Co. When completed, the shed will contain enough storage space for 4-million fbm of lumber. G. R. Schmelzer & Associates of Little Rock are the structural timber erectors.

Laminated Arkansas soft pine lumber makes up the columns, the top and bottom chords of the bowstring roof trusses, and the knee braces; other structural members are not laminated. A total of 311,000 fbm of lumber went into the skeletal structure, while 134,520 fbm make up the roof deck.

The storage shed is 103 ft wide, 468 ft long, 70 ft high at the apex of the roof, and 56 ft high at the side walls. The building rests on concrete piers supported on drilled caissons. The caissons are 42 in. in dia, belled at the bottom to a 10-ft dia 35 ft below grade.

About 600 cu yd of concrete went into the foundations. The East Texas Foundation & Drilling Co., Inc., of Longview, Tex. was the foundation contractor.

The wood columns and bowstring trusses were being laminated while foundation work was in



MOMENT CONNECTION—Column base shoes are guided over six anchor bolts that will make the moment connection at footing.



WALL BRACING—Crews bolt laminated wood struts between the columns for bracing. Clips on the columns will hold wall girts.

### Structure Is Simple Erection Job

progress at the building site. Unit Structures, Inc. handled the lamination in its plant at Magnolia, Ark.

Laminated columns were then pressure-treated with pentachlorophenol preservative in an oil carrier to increase their structural strength. This was necessary because, in addition to the roof, the columns also carry a bridge crane with a capacity of 10 tons and a span of 100 ft. Before treating, each column weighed about 4,000 lb; penta treating increased this weight to about 5,000 lb.

The one-piece columns are 56 ft tall and are wider at the top than at the base. Column thickness is 9 in.; the width is 30 in. at the base and 48 in. at the crane rail 42 ft above the floor. A cutback in the columns at this height provides space for the crane rail supports. Above the cut-back the column width again is 30 in. Column spacing is 23 ft 4½ in.

Column erection procedure was similar to that for steel columns. An American truck crane simply picked up each column and lifted it into place. Tightening six anchor bolts at each column base plate completed this operation.

Column base plates are 1½ in. thick, 15 in. wide and 39¼ in. long. Columns are connected to the foundations with a moment connection at the base. No guy wires were necessary for column support during erection because steel for the moment connection was attached to the columns before erection.

The column base assemblies contain about 75% of all the steel used in the building.

With the columns in place, the crews installed side girts and laminated struts between the columns. The struts give lateral support to the building, while the girts hold siding in place. The crane beams and rails then were installed for a P&H high-speed bridge crane.

#### Trusses

After the columns were in place, Schmelzer assembled and erected the 21 bowstring trusses. At this time also, crews attached clip angles to the tops of top chords of the trusses. The clip angles hold roof purlins in place. To erect the trusses, the crane was equipped with a spreader bar, and it lifted an entire truss, complete with knee braces, into position at one time.

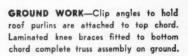
The trusses span the entire 103-ft width of the building. All connections for fabrication and erection were made with TECO timber connectors and bolts.

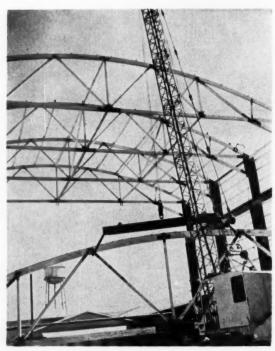
Truss-to-truss bracing followed closely behind truss erection. Next the purlins were bolted to the clip angles on the top chords of the trusses. Roof decking of 2x6-in. tongue-and-groove Southern pine was nailed to the purlins.

Once the erection of the structural members was









TRUSS ERECTION—Truck crane equipped with a spreader bar picks up a completed truss in one piece and lifts it into position.

SIDING ERECTION—Six carpenters and two laborers install siding to complete the storage shed. Siding erection took 1½ months.



completed, various crews went to work installing the roofing, electrical system, siding, and sprinkling system. All of these operations progressed at about the same time.

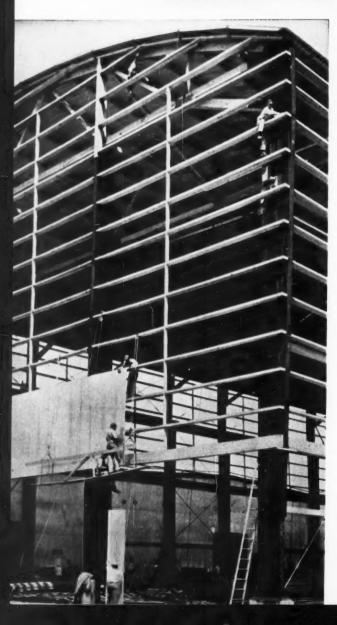
Erection of the skeletal structure took 2½ months and required ten ironworkers, six carpenters, and six laborers. Six carpenters and two laborers installed corrugated galvanized metal siding in 1½ months. The roof deck was erected in four weeks by a dozen carpenters. Only other major equipment besides the American truck crane was a compressor, impact wrench, and a winch truck.

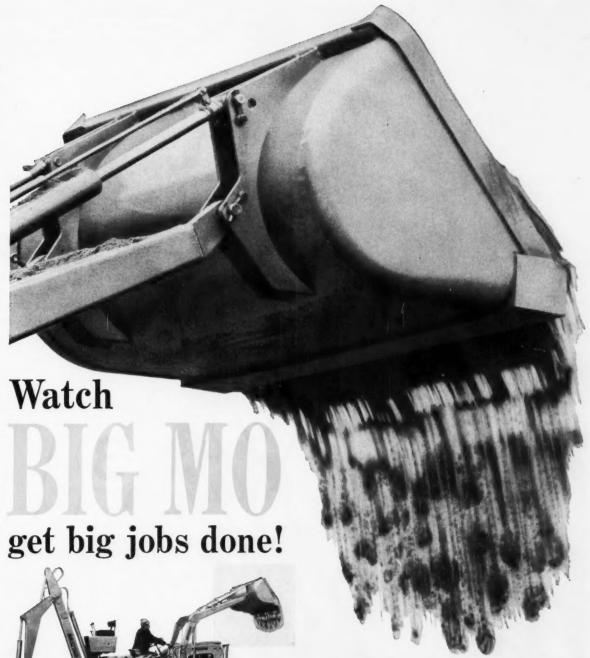
Construction of the storage shed was started in January and has just been completed.

#### Men on the Job

Eben Bailey is the plant engineer for The Crossett Co. Consulting engineer for the job is H. E. Bovay, Jr., of Houston, Tex. Ray Petty is the resident engineer.

Unit Structures, Inc., headquartered in Peshtigo, Wis., designed the building and fabricated all timber structural members. Steel for the crane rails and for structural connections was fabricated by Mosher Steel Co. of Houston. The Crossett Co.'s own crews erected the roof deck and handled the electrical work. Rainey Terrell of Farmerville, La., completed the roofing and installed the siding.





Big-muscled and big-mouthed, with an appetite that just won't quit. That's Big MO.

Take the no-clutching shuttle reverse, for example. Big MO steps right up, takes a big bite under full power, backs away fast and dumps—all with the flip of a lever. Leaves others fumbling with their buttons. More work per hour (and more profits)—that's Big MO's specialty.

And on Big MO's other end is the workin'est backhoe you ever saw. It digs in 12 ft. 6 in. at any point in a 190° swing. With 7000 pounds of digging force. Digs straight sides and square corners. And the offset seat pivots with the boom so the operator can see what Big MO is doing at all times.

Want proof? Stop in at your Moline dealers. Have him demonstrate what Big MO can do. If you're looking for a hard-working, trouble-free, profit-making loader, Big MO is your boy.

\*Moline Dealers give the best Parts Service in the Industry.

MINNEAPOLIS\*

The fastest-growing line of industrial equipment!

Builders of America know:

# Just putting up wood frame structures, but time and profits could be lost if...

- The carpenter overhead drops hammer on someone below
- 2 Unbraced rib frame collapses
- Sill of endwall kicks out
- 4 Foot base-plate rolls

Putting up Quonset-type buildings these days is routine. But the more you take a job for granted, the more chance you take of overlooking hazards that could lead to costly accidents.

That's why you should call in the American Mutual Safety Engineer. His special training, solid experience and know-how will enable you to do the job in the safest, fastest, most profitable way.

The AM Safety Engineer studies your project, searches out potential dangers, consults with

the contractor and his superintendent, and suggests safety measures for the protection of workers and equipment.

Result: Safety counseling that helps you have fewer accidents...fewer work stoppages...lower expenditures for workmen's compensation insurance. Jobs finished on schedule... greater profits for contractors. All very good reasons to call on the A<sub>M</sub> man for your many casualty insurance needs! American Mutual Liability Insurance Company, Dept. CM-3, Wakefield, Mass.

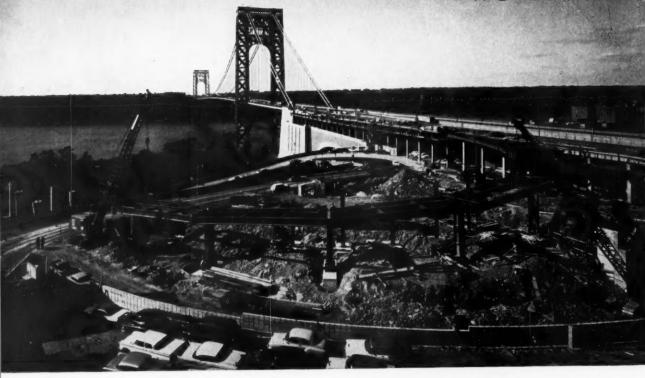
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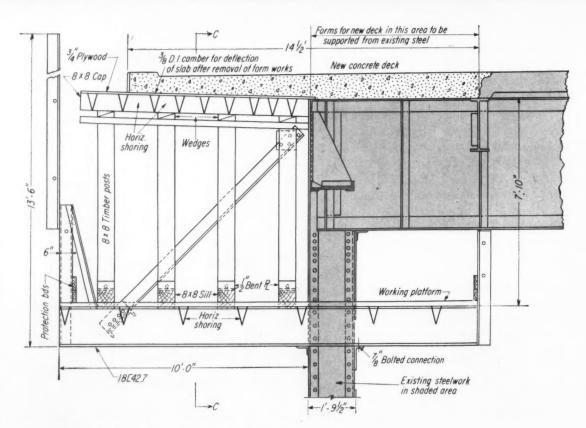
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a leading writer of Workmen's Compensation,
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LIABILITY INSURANCE COMPANY

### Two Level





Page 122—CONSTRUCTION METHODS and Equipment—June 1960

### **Scaffolding Holds Deck Forms**

Part of extensive work being done on the approaches to the George Washington Bridge, this job features a scaffolding system that cantilevers from columns at the sides of the bridge, serving as a work platform and supporting deck forms.

WIDENING the upper deck of an elevated approach to the George Washington Bridge in New York City calls into play an ingenious two-level scaffolding system that acts both as a working platform and as a support for concrete deck forms.

Channel brackets that cantilever out from the supporting columns at the sides of the approach span support the scaffolding. Adjustable trussed steel joists play an important role in the scheme, spanning as much as 27½ ft between outriggers.

Contractor Tully & DiNapoli, Inc., of New York holds a \$1.1-million contract for the work on the approaches at the New York end of the bridge. Although it took a lot of planning, widening the deck is only a part of the job. The contractor also will build a curved access ramp that swings down from the widened lane on the south side of the bridge. Another contractor, Gull Contracting Co. of Flush-

NEW APPROACH RAMP—Exit ramp curving down from upper level of bridge juts from 750-ft-long section of widened deck on the south side at the New York end.

2x6@ 18"cc. Nailing strip. Wedges 8×8 Cap Horiz. shoring-3 x 8 Cap -Scabs Bent P 3/4 Bolt Working platform-Spike 15 Bent P 8x8 Sill Horiz, shoring-2'8/2 18 E 42.7

Section C-C

ing, N. Y., is building a similar ramp on the north side. They are endorsing T&D's scaffolding system by using the same scheme for widening a section of the deck leading from this ramp.

Tully & DiNapoli is widening the outside lane that feeds these ramps on both sides. On the south side they have completed a 750-ft-long section that extends the deck about 7½ ft beyond the old fascia. They are now forming and pouring a similar section about 400 ft long on the north side.

A temporary barricade separates the work area from the outer lanes carrying bridge traffic. The barricade sits about 11 ft inside the old curb, where the existing deck slab has been broken off. The new deck slab extends 14½ ft from the old curb line. A new curb will be poured separately on top of the widened section, about 6 ft beyond the old curb line.

#### Crane on Top Deck Erects Steel

A subcontractor, J-K Welding Co. of Yonkers, N. Y., erected the steel portion of the scaffolding system with a cherry-picker crane working from the existing deck slab. First it lowered and held twin 18-in. channel outriggers that workmen bolted to each side of the columns supporting the bridge deck. Total length of these outriggers is 16 ft, 9 in. Placed about 10 ft below the top of the existing deck slab, they extend 10 ft beyond the face of the column in front.

Then the crane handled erection of 4x6-in. angle hangers that extend diagonally from plates near the top of the columns to near the outboard end of each channel outrigger.

Next the crane placed Spanall trussed joists on 2-ft centers to span between outriggers. The spacing between columns varies from 20 ft, 4 in. to 27 ft, 10 in., so the joists have to span these spaces. Wood planking on top of the joists provides a safe platform for workmen putting into place the timber that holds the second level of the scaffolding, which acts as deck formwork.

But first a crew with paving breakers cut off the existing deck slab at the old curb line. The chunks of concrete fell from the edge of the bridge onto the work platform at the first level of the scaffolding. Workmen loaded the fragments onto wheelbarrows and delivered the chunks of concrete to trucks at the end of the platform. After concrete removal, form construction began.

T&D wanted to carry the load of the deck concrete directly into each channel of the outriggers. They placed 8x8 timber sills across the gap between channel outriggers at each column. Bent plates spiked to the sills hold 8x8 posts atop the end of each sill. In this manner four post-supporting sills spaced at about 2-ft intervals were erected on each outrigger. Height of the posts above the top of the outriggers is about 8 ft.

continued on next page



**ERECTING FIRST LEVEL**—Subcontractor placed steel in first level of scaffolding system with a cherry-picker crane working from the top deck of the bridge.



POURING DECK SLAB—Transit-mix trucks deliver concrete and crew chutes it directly into forms. They place about 75 yd per day, skipping alternate sections.

Scabs at the top of the post hold in place two superimposed 3x8 and 8x8-in. caps that span between posts. Pairs of wood wedges separate the two caps. The top cap holds the Spanall joists that span between outriggers and support the deck forms. Preset camber in the Spanalls takes care of deflection under the weight of the concrete. Nailers 1-in.-thick on top of the joists hold ¾-in. plywood sheets to form the bottom of the deck slab.

To hold the deck forms in the gap at each column, 2x6's on 18-in. centers are set between rows of posts.

Wire mesh attached to angle iron posts welded to the ends of the outriggers protected workmen on both levels of the scaffolding during form erection.

Tully & DiNapoli bought enough material to build only about 500 ft of the two-level scaffolding system. When all scaffolding was in place they began pouring the deck slab a section at a time. Sections vary in length with the distance between columns. T&D skipped alternate sections so that temporary bulkheads forming construction joints can be removed easily between pours.

Transit-mix trucks deliver concrete to the pour areas, and the crew chutes it directly into the forms. After pouring and stripping they dismantle the steel scaffolding and erect it at another section.

The crew places 75 to 100 yd of concrete per day on the average. The widened section on the south side took about 400 yd, twice as much as the section on the north side will take.

In cold weather the contractor placed salamanders on the wood platform beneath the slabs to warm the freshly placed concrete. Tarps covering the concrete and draped over the sides of the scaffolding helped retain the heat.

Tully & DiNapoli started the job about a year ago, and expect to wind it up this month. Harry Key is their superintendent at the site; Reginald Argentieri is engineer. Resident engineer for the Port of New York Authority is Harry Druding.





HOW POWER-STEERED,
POWER-SHIFTED . . .

Even moving a blade-full of shot-rock around the curve, there's no hesitation, no sluing to spill the load. The TD-25's operator has separate speed control of each track to get full-capacity performance, full time. And only the new TD-25 has the power plus of the direct-start, turbocharged DT-817 International engine—that delivers 230 high-torque hp!

### TD-25 takes

#### -on California mining operation

Even before all the blast dust has settled, this International TD-25 is slamming tons of shot-rock from the benches, so trucks can resume hauling to the processing plant. Then, at this gypsum mine in California, the "25" takes over the "shovel-feeding" chore—dozing full blades of rock upgrade, downgrade, and 'round the curves, to help keep the big dippers swinging full. And in between times, the "25" takes over its third tough project: benching new haul road around mountain slopes!

Three slam-bang rock operations to handle—it's a made-to-order situation for the Planet Power-steered TD-25!

"Dead-track drag" eliminated! You don't brake a track and "half-kill" your pull-power to turn, as you do with king-sized clutch-steered crawlers. With Planet Power-steering you simply change the speed of one TD-25 track—on-the-go, and with 2-finger ease! Around comes the fully-loaded TD-25—with "live" power on both tracks and both tracks pulling. Load-limiting "dead-track drag" is eliminated!

And combined, on-the-go Hi-Lo power-shifting lets you match power to load, instantly—forward or reverse. Just shift one track to high range—the other to low—to do slope-hugging, full-bite benching, or to operate straight ahead with off-center loads!

The "25" is platformed on new 7-roller tracks with double-box-beam frames. The design provides super undercarriage strength for slambang conditions—strength to match the full effort of the direct-start, high-torque DT-817 International Diesel engine.

Power-steer and power-shift the TD-25 with king-sized loads. Measure the bonus capacity you get with exclusive Planet Power-steering and Hi-Lo power-shifting. See how this control combination enables you to outearn other big rigs up to 50%. Then measure what it means to get this double-barreled advantage only in the TD-25—and as standard equipment to boot! Let your International Construction Equipment Distributor demonstrate.

International Harvester Co.
180 North Michigan Ave.
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International® Construction Equipment



"Boulder-dozing" after blasting— The TD-25 does some "blasting" itself to move "big-as-a-house" hunks of rock aside. Heavy-duty TD-25 Dura-Rollers defy the rock-dozing "grind"—with the industry's thickest shells to prevent flexing—positive grit exclusion—and 1,000hr.-interval lube capacity!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!



## over three slam-bang rock jobs



How
exclusive
clam-action

speed demolition

... double for

whole spreads of limited-duty rigs!









International Harvester Company, Chicago 1, Illinois Drott Manufacturing Corp., Milwaukee 15, Wisconsin

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Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!

"One week with 4-in-1 beats all summer with previous rig"

-Jack Doub,
Raleigh, North Carolina

Grabbing heavy "Siamese-twin" stumps, this International® Drott TD-15 shows exclusive 4-in-1 clam-action "bite"—doing tough subdivision land-clearing work ordinary loaders can't touch! "The first week after the TD-15 Four-in-One took over, we burned more stumps than the previous inadequate equipment disposed of all summer," reports owner Jack Doub, Raleigh, North Carolina. "There's no other loader to compare with 4-in-1 versatility, especially in land clearing. The TD-15 Four-in-One has plenty of power, plus unmatched balance to handle full loads without nose-down or strain."

"4-in-1 cuts need for extra rigs ...saves costly hand labor, too"

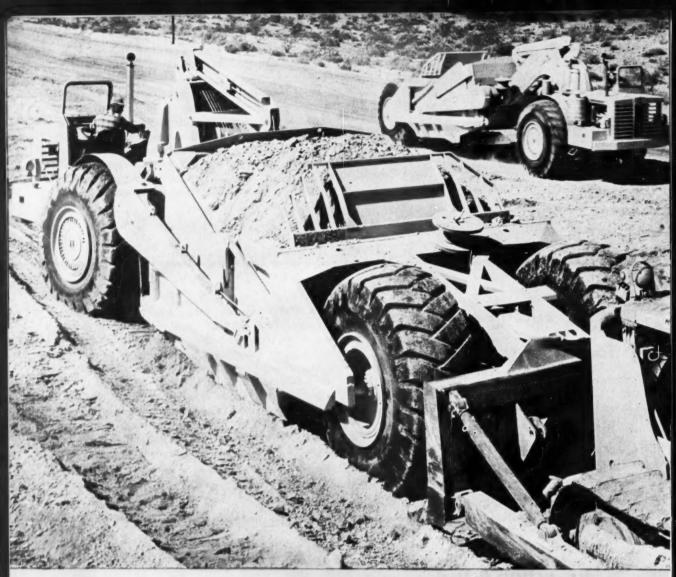
-M & M Wrecking Co., Inc. Richmond, Virginia M & M Wrecking Co., Inc., are contract and salvage wreckers. Their TD-6 Four-in-One is used to demolish structures, level and rough grade afterwards, and load out reusable materials and rubble. Photo shows their 4-in-1 ready to load a steel I-beam which it has picked up with clam-action "bite." Unit also dozes the rubble into piles. "In our work no two jobs are alike, and bucket applications change on nearly every pass," states B. Nelson Mills, the wrecking company's secretary-treasurer. "The 4-in-1 has cut the need for added machines, and saves costly hand labor, yet does our work far faster than any method previously used."

"Clam-action 4-in-1 can 'bite' and bottom-dump hardto-handle materials"

-John J. Duane Company, Quincy, Massachusetts "Our TD-20 Four-in-One does an efficient demolition job on all types of buildings," declares John Duane, for the wrecking company of his name. "The 4-in-1 bucket has many advantages in this type of work as it can 'bite' hard-to-handle materials by clam-action and bottom-dump into high truck bodies. We are clearing 50 acres of buildings in west Boston and have loaded out three-fourths of the rubble with the 4-in-1. It is a time-saver and money-maker for us." Picture shows Mr. Duane's 4-in-1 bottom-dumping into a high-sided truck. Even "impossible" conglomerations of wood-and-masonry rubble, that frustrate ordinary buckets and multiply disposal costs, can be loaded with amazing speed and economy with the clam-action 4-in-1!

Why limit your income, either on construction or demolition, to what an old-style "single-action" loader can earn you? Try the 4-in-1 machine actions shown here. Then try 4-in-1 power-shovel-like, pry-over-shoe excavating power. Then, 4-in-1 full-size bulldozing performance. And then, versatile 4-in-1 "carry-type scraper" grading-spreading abilities. Prove you get a

whole equipment spread of actions—and each 4-in-1 action "doubles" for one or more specialized machines! See how exclusive, shock-swallowing Hydro-Spring adds operating comfort and prolongs equipment life. See your International Drott Distributor for a 4-in-1 demonstration!





With the planet-powered 230-hp TD-25 pushing—and with 375 high-torque International Diesel hp under the "295's" hood—you heap on 34-cu. yd. with amazing new speed. Even in toughest loading conditions, "X"-member reinforcing maintains perfect Payscraper push-frame alignment!

Note that the Payscraper apron lifts to a big 94-inch opening. Two ejector-plate pushing members apply dozer-like action to force out the whole 34-cu. yd. load cleanly. The 122-inch bowl width speeds unloading, and loading, too—adds control ease and stability, loaded or empty.





# How Payscraper power and power controls boost your dirt-on-fill delivery!



You get highest power-to-payload punch of all rubber-tired rigs in the 34-cu. yd. International 295 Payscraper. The fast-slugging, high-torque 6-cylinder International DT-817 Diesel is the Payscraper power plant.

The direct-start, 375-hp DT-817 is turbocharged to give you all-altitude, high-efficiency performance—power for cycle-speeding rim-pull—plus time-saving "no-lag" control power!

You power-shift the Payscraper, up or down—and the 4-speed planetary-type, torque-converter transmission provides load-speeding automatic direct-drive lock-ups in second, third, and fourth gears!

You power-steer the 150,000-lb.loaded Payscraper almost as easily as a 3,600-lb. automobile. Payscraper gives you the big control advantages of (1), exclusive International rack-and-pinion plus tandem pump steering system; and (2), 3-degree forward spindle pitch that

improves scraper balance and prevents "nose-downs" in high-speed turns!

You power-control Payscraper dirthandling actions with fingertip ease with the International PTO-driven Cable Control Unit. One cable drum of this simple planetary system actuates the apron and ejector; the other drum positions the bowl to control loading and spreading! Reach-easy Payscraper power brakes give you fast, positive stopping!

Ease into the bump-smothering Payscraper seat—press the direct-start button—power-shift the outfit into action. Compare the speed of loading, roading, and dumping the 122-inch bowl. See how the advantages of DT-817 Diesel power and complete, positive Payscraper power control can boost your dirt-on-fill delivery. Choose the 2-axle "295," or 3-axle, 34-cu. yd. "495." See your International Construction Equipment Distributor for a demonstration!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!



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Positive power-control of all operations adds safety, builds operator confidence — makes him "haul-speed minded" to help you get full capacity and profit from Payscraper speeds up to 33.5 mph. For example, safe, effortless tandempump power-steering leaves "the steering feel in the steering wheel"— gives positive, one-hand controll

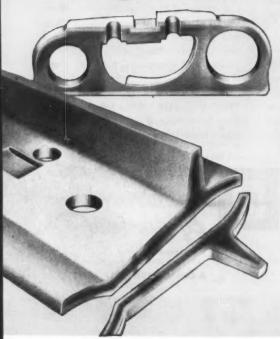


You bought the right equipment...

now keep it right...



### with genuine IH replacement parts





Machine-mauling conditions take their toll on machine components—even of parts made of the finest alloy steels, and "armored against wear" by the most effective heat-treatments. When time comes to replace International crawler parts, don't be satisfied with "look-alikes"! Demand the satisfaction and care-freedom of the originals. Replace with genuine International parts...the only parts that have original IH fit-and-fitness.

For example, here is the long-life construction that makes International tracks best. Steel used in IH track shoes is made by IH steel mills to close specifications. Shoes are Tocco-Hardened electrically, producing the most desirable hardness patterns, with key-way and bolt holes that are a perfect fit to the track rails. Track links are forged steel with desired hardness on all wear surfaces, and precision machined for perfect fit with pins and bushings. Hardness pattern of pins and bushings affords a hard outer shell with a flexible core for long track chain life.

International parts and service facilities are always nearby, with a network of 12 parts depots and more than 200 distributor outlets. You get the part you want, when you want it!



International Construction
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I-R's new, rugged, but compact K6U Hoist easily handles heavier loadings which ordinarily tie up cumbersome cranes and other expensive equipment. It can handle bigger loads than any other single drum air hoist on the market. Yet you get the same adaptability and light handling characteristics that made its smaller predecessors real time and money savers on materials handling jobs in all industries.

**CRANES!** 

Rated capacity is 7000 lbs. with maximum speed of 65 ft. per minute. (Companion hoist K6UA available with rated capacity 5000 lbs. and maximum speed of 95 ft. per minute.)

Hoist has reversible 6-cylinder Air Motor with safety-type throttle which shuts off automatically when released. Reversible motor permits full control of suspended loads with throttle only. (Remote control equipment optional.) Can be mounted in any position for a wide variety of lifting and pulling jobs.

For details, call your nearby I-R representative.

Tools plus AlRengineering increase output per man



New I-R Size KóU

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That's why we can say, "The best dam\* concrete and the most concrete passes thru the grout-tight, self-closing, non-jamming double clamshell gates of Gar-Bro Concrete Buckets."

Only Gar-Bro offers you patented double clamshell gates, patented accordion hopper attachments, suspended steel sub-hopper attachments with Elephant Trunk or Steel Drop Chutes. Yes, and only Gar-Bro Buckets are equipped with fittings for easy attachment of these important accessories. No wonder contractors everywhere prefer Gar-Bro Concrete Buckets.

See your local Gar-Bro dealer or write for catalog which illustrates and describes more than 300 items for handling and placing concrete.

Gar-Bro Mfg. Co., Los Angeles, Calif.-Peoria, Ill. General Offices:

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\*Concrete for dams, bridges, buildings and all construction projects.

### **GAR-BRO Buckets**

The World's Most Complete Line of Concrete Handling Equipment



29 models capacity/1/3 to 8 cubic yards



OAHE'S UPSTREAM FACE—Crawler crane works from a platform with an orange peel to distribute boulders for a riprap project that is 2 mi long, 350 ft wide, and 5 ft deep.

### How to Rap Up a Riprap Job

AN ALERT CONTRACTOR capitalized on a geological phenomenon that dates back to the ice age to win a \$2.7-million riprap contract at Oahe Dam near Pierre, S.D. Missouri Basin Construction Co. of Mitchell, S.D., got the jump on its competitors by obtaining exclusive rights to nearby rock fields created by a glacier between 10,000 and 35,000 yr ago.

The construction firm is currently at the halfway mark in laying riprap 2 mi long, 350 ft wide, and 5 ft deep on the upstream face of the earthwork dam on the Missouri River.

The project, the largest of its kind in the world, requires 215,-000 cu yd of sand in a filter blanket 1 ft thick, 215,000 cu yd of 4 to 6-in.-dia spalls 1 ft thick, and 640,000 cu yd of boulders for a top layer 3 ft thick. Of the total quantity of boulders, 261,600 cu yd are coming from a stockpile exposed by the excavation for the dam. The remaining 378,400 cu yd represent the key to Missouri Basin's successful bid. They are being field harvested.

These gneiss and granite boul-



FIELD HARVEST.—Two crawler tractors with rock rakes work together to tumble a huge boulder down a bluff. First the boulders are windrowed, then shot to specifications.

### Trucks Make Haul Of 14 mi from Fields to Dam



LOADING BOULDERS—One truck in a fleet of 20 gets its load of graded boulders.

ders were deposited at the upper edge of the Missouri Valley by a glacier that moved down from the Arctic Circle. As it advanced, the glacier tore boulders loose. some weighing as much as 60 tons, and pushed them along in front like a giant bulldozer. When it receded, the glacier left the boulders behind on the sides of bluffs that rise from the left bank of the river. These boulder fields are concentrated along a 6-mi stretch of river hills near Pierre, and in another section 20 mi north of the city.

As far back as 1953, Missouri Basin took options at \$50 a quarter section on these rocky areas, agreeing to pay a royalty to the land owners if and when the rock removal work began. Even though construction of Oahe Dam was barely underway, the contractor,

with a strong background in riprap work, visualized a major riprap job ahead.

With every boulder in the dam's environs under its control. Missouri Basin sat tight until bids were taken last year. Competitors had to turn to the next nearest sources, the quarries of Minnekaht limestone in the Black Hills and Sioux quartzite near Alexandria, Minn. Although field harvesting costs run about \$1.25 a ton compared with 90c a ton for quarry rock in the car, Missouri Basin more than made up for this difference in transportation. Moving the quarry rock calls for a rail haul of about 175 mi against a 14 mi truck haul from the boulder fields.

"We had a jump on them of about \$1 a ton," says Missouri Basin president, G. E. Gulbranson.

The contractor is carrying out the work in a productive routine. The placement of the first two layers is fairly conventional. Sand for the filter blanket comes from a nearby government pit, and limestone spalls are imported from Rapid City, S.D. Trucks transporting these materials drive down the face of the dam for dumping at the deposit areas. An Allis-Chalmers HD-16 dozer grades the filter blanket and spalls.

The harvesting and placing of the boulders for the top layer represents a more imaginative pro-

continued on page 140

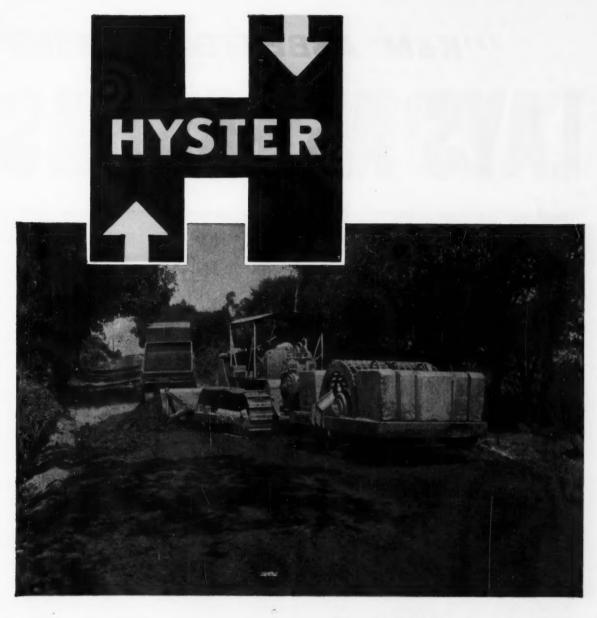


WINCHING TRUCK-Hyster winch on rear of a Cat tractor slowly lowers a dump truck backwards down the embankment. After unloading, the truck will be winched back up.



SPREADING BOULDERS—While truck is lowered slowly to dumping area, a 3/4-yd Insley crane works with an orange peel from a tim-

ber platform to complete uniform distribution of riprap. With this system, 640,000 cu yd of boulders are spread in a 3-ft top layer.



Low Cost Rock Crushing -

### **HYSTER® has it!**

Hyster "Grid" Roller reduces the cost of your base and surface courses.

Use close-at-hand, pit-run rock crushed on the road bed with "Grid" Roller.

Engineered for long service life under toughest job conditions, "Grid" Roller brings new economy to road building.

Ask your Caterpillar-Hyster Dealer for Job Reports No. 30, 36, 38 and 57, or write to Hyster Company, Peoria, Illinois.

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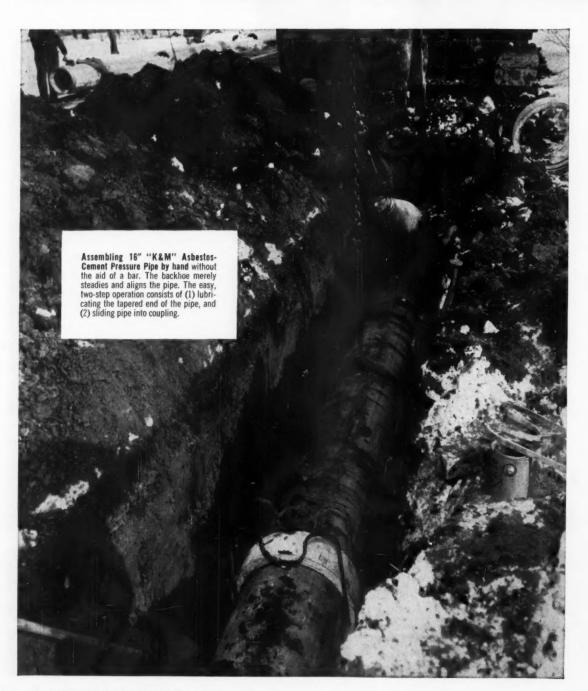
HYSTER COMPANY

TRACTOR EQUIPMENT DIVISION P. O. Box 328 . Peoria, Illinois

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""K&M" ASBESTOS-CEMENT

# LAYS AS FAST AS



### PRESSURE PIPE

# A SHOVEL DIGS...

### G&B Construction, Inc., Youngstown, Ohio, installs 4½ miles of "K&M" Asbestos-Cement Pressure Pipe for the Austintown District of Mahoning County, Ohio

"You can lay 'K&M' Pipe as fast as a shovel can dig. There is nothing that will hold you back with this pipe. When you can lay a 16" water line, and it goes in as easy as an 8" water line, what more could you ask? They've got a good joint with that FLUID-TITE® Coupling . . . the pipe is wonderful to put together. There is no comparison between the FLUID-TITE Coupling and other couplings. Of all the 'K&M' Pipe we've laid, we never had a coupling break. Coupling breaks are very common with other pipe."

Those are the comments of Louis Gulfo, partner with Mike and James Bertilacci in G&B Construction, Inc. They installed "K&M" Asbestos-Cement Pressure Pipe in bitter cold, during February and March 1960. However, neither rain, snow, nor mud interrupts the installation of

this modern pipe. The exclusive, patented "K&M" FLUID-TITE Coupling and the simple fitting procedures required make assembly easy.

Little or no maintenance will face Mahoning County, which built and will operate the system for a year, or the City of Youngstown, Ohio, which will then take it over. Being non-metallic, "K&M" Asbestos-Cement Pressure Pipe won't rot, corrode, or tuberculate, and is immune to electrolysis. The suppliers of this pipe were Trumbull Plumbing Supply Co., Warren and Youngstown, Ohio.

Now, in addition, you may use quality "K&M" Plastic Pressure Pipe in the same system with "K&M" Asbestos-Cement Pipe, if desired.

Write today for more information on "K&M" Asbestos-Cement Pressure Pipe to: Keasbey & Mattison Company, Ambler, Penna. Dept. P-1460.



### Keasbey Mattison at Ambler

Left to right: Louis Gulfo, G&B Construction, Inc.; Dale MacCleary, sales manager, Trumbull Plumbing Supply Co.; James Bertilacci, G&B Construction, Inc., Burke Lyden, Asst. Chief Engineer, Youngstown, Water Dept., Jim Bisciglia, Asst. Engineer, Mahoning County, and J. Henry Painter, Trumbull Supply Company.



3 miles of 16" "K&M" Asbestos-Cement Pressure Pipe were installed. Here, we see it ready for installation along Webb Road, in Austintown Township. In branching from the 16" water line, Mahoning County used 1 mile of 12" "K&M" Asbestos-Cement Pressure Pipe and ½ mile of 8" "K&M" Asbestos-Cement Pressure Pipe. Specifications call for 90 lbs. pressure when line is in operation serving 16,000 residents.





FINISHING TOUCH—A motor grader works along a relatively flat slope on the dam's face as ripraping draws to a close on one sec-

tion. In addition to field-harvested boulders, the \$2.7-million project requires a sand filter blanket and 4 to 6-in.-dia limestone spalls.

cedure. Harvesting proceeds from the crest of the hills-the areas of greatest concentration - downward to obtain the aid of gravity in tumbling the rock to the bottom of the bluffs. The rocks, some partially and others wholly embedded in the earth, are torn loose and windrowed at the bottom of the hills by six HD-16 tractors equipped with rock rakes. largest single boulder weighed 60 tons and took three tractors to move it, but most of the rocks range downward from 10 tons and 5 ft in their largest dimension.

#### Rock Blasting

To meet specifications, the largest boulders are shot to proper size after they are windrowed, with a delay-blasting sequence that results in a clean cleavage. Charges are inserted in shallow air-drilled holes. Normally, the rocks are fairly well graded by the time they are windrowed at the bottom of the hills. A finer gradation is attained by the blasting operation.

Missouri Basin takes advantage of this uniform gradation during the loading to minimize the handling of rock later on at the dam site. Two HD-16G and one HD-11G tractor shovels load 20 International tandem trucks with Galion bodies that haul rock to the crest of the dam. One truck is loaded with small and intermediate size boulders for every two trucks that are loaded with big boulders.

When a truck reaches the crest of the dam, a cable attached to a Hyster winch on a Caterpillar tractor is secured to the front of the vehicle and it is lowered backwards down the  $2\frac{1}{2}$ :1 slope to the deposit area. After dumping the rock, it is winched back up again.

Two ¾ yd crawler cranes with 35-ft booms, one an Insley and the other a Northwest, work with orange peels to complete the uniform distribution of boulders on the slope. A timber platform built of four wedge-shaped skids provides a level working platform for the cranes. Three skids take the

weight of the crane. The crane moves laterally across the dam face by shifting the fourth skid from one end of the platform to the other end with its hoist line. The crane is moved up and down the slope with a cable from the tractor winch on the dam's crest.

#### Land Restoration

Owners of the rock fields get a side benefit from the harvesting operation. After working each field, the contractor grades all banks and smooths out spoil. With seeding, the fields become productive grazing land. The cost to Missouri Basin is small, but the firm expects that the good will created will help it in future negotiations for rock rights.

For Missouri Basin, Gulbranson is acting as project manager, Verne Willeford is general superintendent, and Scotty Graff and Doug McQuade are foremen at the embankment and harvesting site, respectively. John Sibert, Jr., is area engineer for the Omaha district of the Army Corps of Engineers.



Ford 801 Series Powermaster tractor with beavy duty front end, Ford Extra Heavy Duty loader, Ford 12' backboe.

#### FORD PRODUCTIVITY REPORT



Robert Rogers, owner Handy's Trucking Co., Wallingford, Conn.

### "I put a quarter-yard power digger in dead storage after I got my Ford"

Mr. Rogers reports: "I've had 5 years of backhoe work, and this Ford beats them all. I've got a truck-mounted cable type digger I can't even afford to use any more. The Ford works almost as fast, and doesn't cost near as much to operate. And I can take the Ford into places the bigger rig can't even go. I've got another tractor backhoe, too, but it doesn't compare with Ford. A job that takes 12 hours

with the other backhoe, for instance, takes me about 8 hours with Ford. On this sewer job here, Ford will save me at least \$75. I like Ford's undercutting, too. Went under a water main on this job and didn't shovel a wheelbarrow full of dirt. Never tear up a sidewalk any more. The only thing I can find wrong with Ford is that my other backhoe isn't one of them. And believe me, it soon will be."

Ford Motor Company,

TRACTOR AND IMPLEMENT DIVISION . FORD MOTOR COMPANY . BIRMINGHAM, MICHIGAN

FORD CAN BE YOUR STAR PRODUCER, TOO . . . See your dealer soon!



Ford 1801 Series Industrial diesel tractor with Ford Super-Duty loader

#### FORD PRODUCTIVITY REPORT



George Kalinovik, manager National Coal and Oil Co., Detroit, Michigan

### "My Ford loaded 10,000 tons of coal last year—fuel cost about 2¢ a ton"

Mr. Kalinovik reports: "We load from 15,000 to 20,000 tons of coal a year—over half of it by loader into trucks or conveyor hoppers. This figures out at roughly 33 tons a day, from one to two hours of actual tractor work, and fuel for my Ford is about a gallon or 16¢ worth an hour. I can do five times as much work with the Ford as with my old loader. It's a much bigger bucket, and more important to me, power steering makes handling

easy even where trucks have cut ruts in the yard. With the old loader, my arms got so tired they'd be shaking after I worked for a while. We load high-sided trucks we couldn't even reach before without a conveyor. We push rail cars wherever we want them. We even use the loader as a jack to change truck tires. We get all this with Ford—speed, big capacity, high dump, easy steering and low fuel cost. What more could you ask?"

Ford Motor Company,

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Ad 41-0



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WORLD'S LEADING MANUFACTURER OF VIBRATORY EQUIPMENT FOR OVER TWO DECADES.

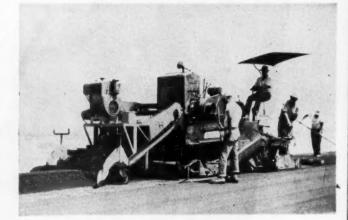


BLACKTOP HAULER—A Gar Wood 20-yd bottom-dump semitrailer unit deposits its 26-ton load through air-operated gates into a windrow sizer ahead of the paving machine. Discharge time is 4 min.

#### New Windrow Paving Method Speeds Blacktop Work

Big bottom-dump hauling units windrow hot mix ahead of the paving machine, and a loader transfers it to the paver itself. One California operator claims the technique is twice as fast using smaller end-dump trucks to feed the paver directly. But care must be taken in windrow sizing.

> PAYER FEEDER—Welded to the front of a Barber-Greene payer is a Clark loader that picks up windrowed blacktop material and deposits it in payer's regular hopper.



FASTER and more efficient asphaltic concrete paving has resulted from use of a new windrow technique developed by contractors and haulers on the West Coast. Essential to the operation are large-capacity bottom-dump trucks and feeders for the paving machines.

The trucks deposit the hot mix in a windrow ahead of the paver. An elevating feeder attached to the front of the paver picks up the mix, drags it up an incline, and dumps it into the paver's hopper.

Advantages of the system are many. To haul the asphaltic concrete from mixing plant to paver, for example, large high-capacity bottom-dump trucks can be used instead of smaller end-dump units. And paver operation is continuous because there is no wait for trucks to be positioned. Also, there is no danger of seams in the pavement caused by trucks bumping the paver. And, finally, the paver need not push the mix-delivery truck as it must in a standard paving operation.

But there are drawbacks, too. The windrow must be accurately sized. The worst fault is to have too little material in it. Filling in the resulting gap becomes a hand operation. Best results come from making the windrow slightly larger than necessary to be sure that there is always enough material for the paver to handle.

Another precaution that must be taken is to keep the windrow relatively short. If it is too long, there will be excessive heat loss before the mix gets into the paver. This is particularly critical on windy and cold days. Maximum windrow length is about 300 ft ahead of the paver.

A final drawback is the fact that not all paving machines can be used. The 1960 Standard Specifications of the California Division of Highways restrict the windrow method to use with pavers that have a hopper with a movable bottom conveyor to feed the screed.

The windrow paving method actually was devel-

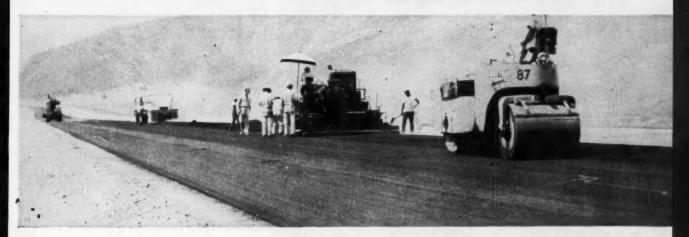


PAVING TRAIN—Paver feeder and paving machine follow big hauling unit down California highway to lay bituminous concrete.

> WINDROW SIZER — Bottomless box hooks to truck, meters mix.

FINAL OPERATION—A Buffalo-Springfield two-axle tandem roller follows the paver to compact the asphaltic concrete.





oped for the trucking industry so that better use could be made of large-capacity trucks. A typical example of a proponent of the technique is Rock Transport Inc., of Redding, Calif., operated by A. T. Stennett. Stennett claims the method is 1½ to 2 times faster than using end-dump trucks to feed the payer directly.

Stennett's outfit has 26 sets of Gar Wood 20-cu-yd semi-trailer and trailer units with air-operated bottom-discharge gates. These Gar Wood hopper rigs were used on a recent job to haul 26-ton loads of hot mix 50 mi from the batch plant. The round trip took 3½ hr and included a climb from sea level to a 5,000-ft elevation while fully loaded. But the mix arrived at the paving operation with less than a 20-deg loss of temperature because the hopper shape of the trucks provides less area from which to radiate heat.

At the paving site each truck deposited its 26-ton load in less than 4 min. Stennett used a skid-type

spreader box to govern the size of the windrow. The windrow sizer was hooked beneath the bottom-dump trailer and was pulled along by it as it discharged. However, some of the operators became so skilled at direct-discharging their loads in windrows that they were able to discontinue use of the spreader box in many instances.

#### Windrow Loader Feeds Paver

A Clark paver feeder made by Koehring Co. of California picked up the windrow deposited by the bottom-dump trucks. The feeder was attached to the front of a Barber-Greene paver and propelled by it. However, the feeder carries a 35-hp Wisconsin gasoline engine to drive its conveyor. The hot mix is simply dragged up an incline and deposited into the paver in a pile. The feeder is 60 in. wide and 9 ft long and can fit on any standard paving machine. Koehring also makes a smaller machine that is only 45 in. wide and 7½ ft long.

#### Faster, easier dozing...



Full-power shift . . . fast-as-a-fox maneuverability



#### EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

#### .. and overall work-ability

#### put the "EUC" C-6 in a class by itself!

No matter what your dozing requirements may be—from small grading work for land improvement, plant sites or secondary road construction to the big yardage projects—the new Model C-6 Euclid Crawler offers the best return on your equipment investment.

The C-6 has proved its ability to "doze circles" around other tractors in the 200 h.p. class on job after job. One of the reasons for this outstanding performance is the full-power shift provided by Torqmatic Drive. There's no time lost in clutching and shifting... a simple flick of the wrist changes from one speed range to another, or from forward to reverse and back again. You save seconds on every work cycle... keep power matched to the load and job conditions.

Modern design, with rear-mounted radiator, gives the operator better visibility for dozing. The blade is close to the front of the tractor where it is in full view and provides good balance and stability. There is a complete line of blades — straight, angle and "U" — engineered for top dozing performance with the C-6. "Feathered steering" results in smooth turning and positive track control . . . a big advantage on difficult slope work.

For all of the reasons why the C-6 has more work-ability on dozing . . . and other crawler jobs, too . . . check with your Euclid dealer for performance facts and figures.

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Good balance with heavy dozer attachments...
rear-mounted radiator permits close mounting of straight, angle or "U" blade at front and provides excellent visibility for operator.
Quick shift permits "rocking" the tractor to get under big boulders, stumps, etc. Power, speed and fast maneuverability, combined with a rugged undercarriage that stands up under heaviest service, make the C-6 a top performer.

Torqmatic Drive...211 net h.p....easy service accessability



## Dozer bulls through 9000 hours without overhaul using Cities Service C-Series Motor Oil



Right down the line. Mr. Farmer and his four sons help in the operation of this growing construction firm. The four boys were taught the importance of efficiently run equipment.



The Farmer sons learned early the value of Cities Service lubricants in the economic operation of machinery. Seventeen-year-old David is shown here running a dozer.

"A man in business for himself has to run his equipment efficiently and economically in order to turn a profit. For the last 12 years Cities Service products have kept my equipment running trouble-free, with a minimum of maintenance costs," says James Farmer.

A prime example is the bulldozer shown above. Using Cities Service C-Series Motor Oil, it has logged 9000 grueling, work-filled hours, without overhaul, and is still going strong. With Cities Service lubricants, another dozer owned by Mr. Farmer ran up 11,000 hours without having the head removed.

In his excavation, quarrying and real estate development work, Mr. Farmer uses four bulldozers, four 10-wheel dump trucks, a trailer truck and other assorted pieces of equipment. All are kept running smoothly and economically with Cities Service Trojan MP gear oil, North Star Oil and C-Series Motor Oil. With high detergency, exceptional heat resistance, and ability to minimize sludge, carbon, varnish and lacquer, C-Series oil is a big contributor to Mr. Farmer's low maintenance costs.

To learn how Cities Service lubricants can help you, talk with your local Cities Service Lubrication Engineer, or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.



QUALITY PETROLEUM PRODUCTS

Savin Bros. crews have their hands full trying to keep moving four directions of mainline road traffic, plus a railway, while they are putting together the varied curves and shapes of a complex Hartford interchange.



## Traffic Is the Big Problem On this Interchange Job

BUILDING the Morgan St. Interchange in Hartford, Conn., is turning out to be mainly a problem in traffic control for Savin Bros. Construction Co. who have a \$4.3 million contract to do the job.

The interchange, part of new Interstate Route 91, is a complex one. It will handle north-south and east-west traffic, both local and express, at the Hartford end of the Bulkeley Bridge linking Hartford and East Hartford, one of the busiest corners in the area. The trouble, as far as Savin is concerned, is that it also has to handle the traffic during the construction because there is no feasible way to detour traffic around the site.

So, for the next 1½ yr, until the August 1961 completion date, construction crews will have to cope with traffic coming at them from all directions.

The Connecticut Highway Department, which is supervising the job, has specified that at least three lanes must be kept open to traffic during the construction. For the most part, Savin has been able to do this, and relations with the local commuters are about as cordial as could reasonably be expected.

Savin is working under an intricate five-stage schedule designed to keep both directions of traffic flowing over the site while



FOUNDATIONS—Lorain crane with Vulcan O hammer drives H-piles for a retaining wall foundation. Job requires about 70,000 lin ft of piling.

#### TRAFFIC PROBLEM . . .

continued

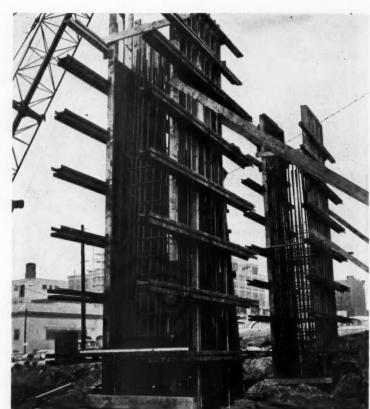
construction is going on. During the early stages of the job, they build as many as possible of the ramps and new road sections that are outside the limits of the existing roads. While this is going on, traffic uses the old roads in pretty much the old pattern. This is the phase they have been in since the job started last August.

The next general phase will involve detouring the traffic over the ramps and new sections plus temporary ramps built for this purpose. This will leave the old roads clear, and Savin will then replace them with new ones.

That's the essence of the schedule—but, of course, the five stage plan is more complicated. It will keep Savin crews hopping around from one small section of the job to another. But it's the only way to build the interchange and keep traffic moving, too.



WALL FOUNDATIONS—After piles have been driven, crews pour foundation slab on top of them. Photo was taken early in spring when weather still required straw insulation.



PIER FORMS—To allow for variable widths of pier caused by two-way batter, these form-backing beams are built of double channels so bolt positions can be adjusted.

#### Concrete Work

Fitting together all the curved sections of the interchange under the piecemeal schedule is like trying to assemble a three-dimensional jigsaw puzzle with some of the pieces missing. In addition, the design poses some problems for the contractor. Piers are battered on two sides and vary considerably in height. Many of the concrete retaining walls are battered as well as being curved.

Savin has designed forms for the batter piers that can be used for piers of various heights. They form the two opposite straight sides of the pier with rectangular plywood panels. The panels are held in place by pairs of beams on each side of the pier that are tied together with rods. Each beam is made of two channels set back to back but held apart the diameter of the rods. The rods can go at any point along the beam and thus the beams are adaptable to any width of pier.

Savin worked on concrete through the winter. They insulated the forms by nailing sheets of Styrofoam between the studs on the backs of the plywood panels. They covered the tops of slabs with straw. And they bought heated concrete for all the pours.

The heavier piers are set on pile foundations. About 70,000 lin ft of 12x12-in. 53-lb. H-piles will be required. Savin is driving them with a Lorain 830 crane and a Vulcan O hammer.

Major quantities on the project include 70,000 cu yd of earthwork, 23,000 cu yd of concrete, and 2,700 tons of structural steel.

#### Railroad Problems

The congestion of the site is increased considerably by a single-track railroad that runs through the middle of the intersection. It has introduced a number of construction problems.

To get a 72-in.-dia sewer pipe under the railroad to the river, Savin decided to jack the pipe 80 ft under the embankment. They subcontracted the job to Deerfield, Ramboring Co. of South Deerfield, Mass. Deerfield set up a jack reaction consisting of a row of 12-



**Grade with Inch-close accuracy** by loading from the bottom with scraper action. Change depth of cut by rolling bucket forward or backward while riding on the exclusive Skid-Shoes.



## <sup>3</sup>/<sub>4</sub> yard economy size!

For thousands of dollars less than ever before you can have the exclusive Four-in-One and its extra profit potential. With either the International® T-340 or the powerful new TD-340 Diesel, you get earning capacity you never could get before in a ¾-yard rig.

The Four-in-One is so much more than a loader ... it's a carry-type scraper, a clamshell, and a bulldozer, too! Simply move the machine selector

**Spot-place your loads...** increase your reach by dumping from the bottom. Gravity draws out sticky materials that clog the corners of conventional buckets.





**Open the bucket all the way** and you have an efficient bull-dozer. Proper curvature of moldboard, which also serves as the back of the bucket, gives a "live" rolling action.

lever to match the tool to the job. You handle a wider range of work than ever before possible with a tractor loader this size.

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\*Maximum engine horsepower at standard conditions.

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"Surround" loose materials instead of chasing them. Clamshell action grabs a full bucketful cleanly and quickly . . . and your tractor never moves from one spot.



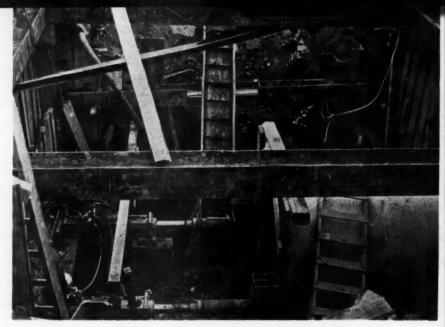
#### TRAFFIC PROBLEM ON INTERCHANGE . . . continued

in, vertical H-piles with two horizontal H-beams across them to distribute the load. They put in two 200-ton jacks to start, replaced them with heavier jacks when the pipe got well into the bank.

The jacks had a 40-in. travel. To move the 8-ft long pipe sections, Deerfield made three pushes with the jacks, putting blocks between jack and pipe for the second and third shoves. During the jacking they excavated the pipe by hand, bringing the muck back to the jack pit in wheelbarrows. A conveyor removed it from the pit.

A smaller rail-crossing that Savin handled themselves involved a 16-in. water main. They did it in an open cut on a Sunday when rail traffic could be stopped.

The railroad passes under the existing roads through two tunnels that have to be modified. The roof of the main tunnel under one street is being replaced. Savin has broken out the former concrete roof and is replacing it with



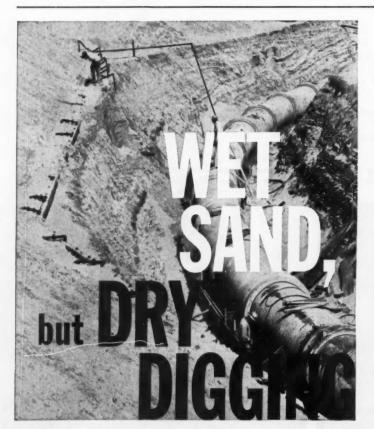
PIPE JACKING—To get a 72-in. dia sewer pipe under the railway to the river, subcontractor jacked it 80 ft. The conveyor removes hand-excavated muck from jack pit.

steel beams and a concrete deck.

The other tunnel remains, but has to be lengthened 72 ft because the road over it is being widened. Savin now is digging the excavation for the foundation with a 3-yd Bucyrus-Erie backhoe and eight 15-yd Euclid trucks.

#### Men on the Job

For Savin, Stanley Fletcher is project manager, Herman Joly is concrete superintendent, and Ed Coffy is earthwork superintendent. Charles Taylor is resident engineer for the State Highway Department.



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from the surf line,
a Stang dewatering system
is predraining an excavation
area of beach sand.
Note the steep angle
and stability of
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In any terrain,
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  ... instant safety torque release protects all drive components.

REICHdrill has built a reputation for keeping maintenance costs low; footage records high.

And these additional REICHdrill features help set drilling records: masts incline for angle drillings; CP heavy-duty compressors assure plenty of air to meet all demands; fastacting, ram-type hydraulic leveling jacks permit use of most rig weight for down pressure; CP "Air-Blast" Bits for extra footage in toughest formations.

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in operation on construction work. Hole size: to 7%"; down pressure: 30,000 pounds. Other models available, truck or crawler mounted, with hole size to 16 inches, down pressure to 90,000 pounds.

T-650 truck-

REICHdrill

mounted



This pipe broke the back of a flood-crazy stream



You're looking at a giant USS AmBridge Sectional Plate pipe-arch (12'-10"x8'-4"x322'-0" long) erected by the Leon Joyce Co. of Minnesota. It handles the run-off from the Bitter Creek watershed near Zumbrota, and is one of the biggest drainage structures ever installed in Minnesota. 

After a heavy rainfall, Bitter Creek turns from a gentle, slow-moving stream into a raging torrent of destruction. Flash floods have aggravated local townsfolk and farmers for years. But in this new, wide-mouthed sectional plate structure, the water simply runs itself out. 

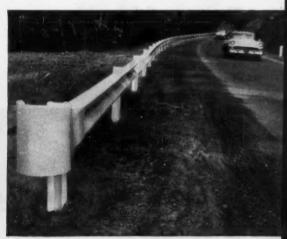
The huge drainage structure is one of four recently installed within a 10-mile area as part of a new four-lane highway system. The other three structures are slightly smaller. USS AmBridge Sectional Plate pipe, pipe-arches and arches are permanent. They won't crack. Won't break. And installation is faster, because there's no need for forms. Write or contact any one of our offices for information on American Bridge Highway Products.

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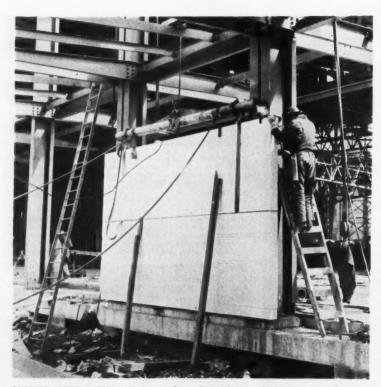
USS AmBridge Highway Beam Guard rail and Posts help safeguard traffic. This rugged, flexible steel beam guard rail is highly visible. It bolts easily but firmly to steel posts and is available in 12'6" and 25' lengths to minimize splicing.

USS AmBridge I-Beam-Lok is a sturdy, lightweight bridge flooring. It installs quickly, easily with less traffic interruptions. The filled type is available in units 6' wide and up to 49' long that apply directly to stringers on spans from 6' up to 8' centers. The open type is also available for spans up to 4' centers.

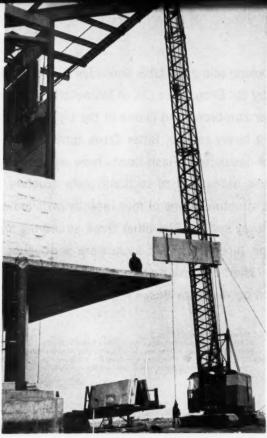


The subcontractor erecting the precast concrete panels that cover 185,000 sq ft of wall area at the Chicago Exposition Hall has to make sure that each one of the more than 2,000 panels is placed within ½ in. of plan location.

# Precast Panels Welded to Frame Form Walls Of Building



CLAMPS HOLD PANEL—Workman adjust clamp that fits between corner of precast panel and outside flange of steel column to hold 41/2x17-ft panel temporarily in position.



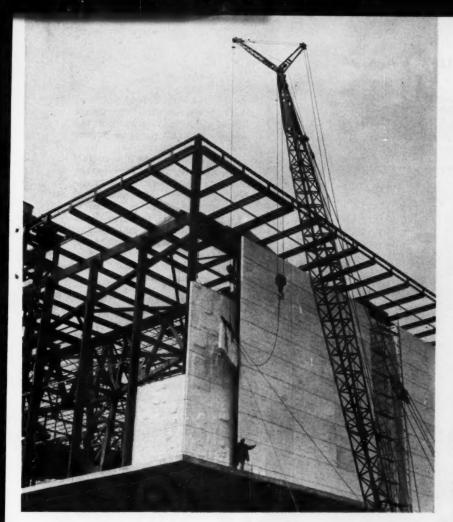
CRANE LIFTS PANEL—Manitowoc crane with 100-ft boom and 20-ft jib lifts 21/2-ton precast panel from bed of truck to three-man erection crew waiting above to weld it to steel frame of building. Each of two crews on job places from 10 to 25 panels a day.

MORE THAN 2,000 precast concrete panels fit together like a house of cards to enclose the structural steel frame of the massive new Exposition Center now rising on Chicago's lakefront.

The panels cover an area of 185,000 sq ft of the building's surface. That's more than the area of 15 football fields. Welded to the steel frame of the building, the panels become an integral part of the building's structure. The project involves the most extensive use of structural concrete wall panels ever seen in the U. S.

#### **Building Decoration**

And more than 152,000 sq ft of the total area of the wall panels are decorated with an abstract bas-relief design cast into their surface. The sculptured pattern relieves the monotony of a three-block-long facade and represents an example of monumental art in building that rivals that used in the ancient temples of the Egyptians. Each of the five sculptured designs is repeated seven times.



The \$34-million building will provide about 300,000 sq ft of exhibition space on its main floor. Heavy steel trusses spanning 210 ft between each pair of support columns hold the roof of the building. They cantilever out from the columns a distance of 80 ft on each side to extend the width of the building to 330 ft. There are 18 bents spaced at 60-ft centers along the 1,180-ft length of the building. Height of the top of the roof trusses above the floor slab is about 50 ft.

#### Steel Erection

Erected by the American Bridge Division of U. S. Steel Corporation, the steel frame of the building required about 7,500 tons of steel. Despite a four month delay caused by last year's steel strike, topping out of the frame several months ago made way for substantial completion of the project on schedule by November, 1960.

American Marietta Co. cast the wall panels at their Franklin

Park, Ill, plant on the outskirts of Chicago. They brought up the 6in. thickness of the 41/2x17-ft panels in several layers, placing first a 1-in.-thick layer of white concrete (the mix called for Trinity White cement) with silicious aggregate and backing this with lightweight concrete. A 11/2-in.thick layer of Styrofoam insulation was sandwiched between the two layers of concrete. Welded wire mesh and reinforcing bars were placed in the 31/2-in.-thick layer of backing concrete. The crew finished the backing concrete with a steel trowel to give a textured surface to the back of the panel, which serves as the interior wall of the building.

#### **Panel Erection**

American Marietta took about five months to cast the panels with a 12-man crew. Flat-bed trucks began delivering 8 to 10 panels pre trip to the job last January. Kenwood Construction Co. of Chicago is the subcontractor handling erection of the panels.

Kenwood has two erection crews at work, each equipped with a crane to hoist the 2½-ton panels into place. One of the cranes is a Manitowoc 2000 with an 80-ft boom and a 20-ft jib; the other is a Manitowoc 3000 with a 100-ft boom and a 20-ft jib. The rig with the larger stick works on the lakefront side of the building where the height from ground to roof is increased by about 20 ft by a glass-enclosed ground floor.

The crews take about 15 min to place one of the full size panels, but sometimes as much as 45 min is required to place one of the smaller corner panels because there they must meet exactly. They average anywhere from 10 to 25 panels put in place per day.

continued on next page



CHECKING POSITION—Crew measures height floor to make sure panel is right.



WELDING—Welder makes 4-in. tack weld between column and steel plate in panel.



CASTING—Concrete mold at bottom of panel form leaves abstract bas-relief design in outside wall surface. American-Marietta crew cast all panels in about three months.

A specially designed spreader bar holds the panels while they are being hoisted into place. It consists of an 8-in. steel pipe stiffened by a steel plate welded to the top where the lift line of the crane attaches to a clevis hook. Rope collars wrapped around the bar hold hooks that fit into lifting eyes cast into the top of each panel. In addition to these two hooks, the crew loops two strands of parachute harness around each end of a panel as a precaution against failure of the other connections.

#### **Panel Positioning**

The crane lifts the panels from the A-frame racks that hold them on the flat-bed truck and swing them up to a three-man crew to place them in position on the steel frame of the building. One man supervises the operation, serving as a signalman directing the crane operator. The other two members of the crew fix the panels in position and weld them to the steel frame.

They first secure a panel in position by placing adjustable clamps between the top edge of the panel and a flange of the steel column on each side. A rachet wrench tightens the tie wire used to pull the bottom of the panel in flush with the back of the columns.

The crew then checks the position of the panel with a carpenter's level to make sure it's square. They use a tape to check distance from the top of the panel

to the floor slab. This height must be checked carefully to insure there will be enough room at the top for the last panel to fit into the building's frame.

To take care of any discrepancy in this measurement, the crew inserts lead shims between the panels as required. Maximum total thickness of shims permitted is \% in.; minimum thickness is \% in. That's plenty to take up any small difference in the size of the panels, which are cast to a close tolerance. Ordinarily they fit together without trouble.

#### Clip Welding

With the panel clamped securely in final position, the two welders adjust their scaffolding so they can reach comfortably the four small steel plates cast into the back of the panels along the column lines. The welders make a 4-in.-long tack weld between the two plates on each side of a panel and the flange of the columns, permanently connecting the wall panels to the steel frame. While they are completing the welding, the crane operator swings the spreader bar down to the two men on the truck to get another panel ready for hoisting.

Panels in every fourth bay between columns are set back, with their faces flush with the back of the column instead of the front. At the sides of these set-backs a third erection crew places small 2x4½-ft panels that cover the exposed sides of the columns. To handle these panels, the crew moves a rolling scaffolding tower equipped with a hoist from one set-back to the next along a concrete slab alongside the building.

#### Joint Sealing

Final operation is caulking the joints between the panels. A separate crew coming along behind the erectors take care of this operation, squeezing a waterproof Thiokol sealing compound into the crack between the rows of panels with a gun.

Construction of the Exposition Center started in January, 1959. Gust K. Newberg Construction Co. of Chicago is the prime contractor. John Hamrin is superintendent for Newberg. Al Gittleman is superintendent for Kenwood, the subcontractor placing the precast panels.



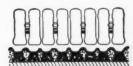
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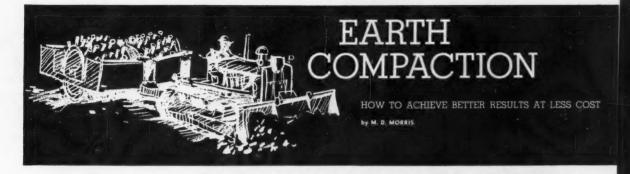
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## 3. COMPACTION EQUIPMENT

IT IS UNREALISTIC to attempt to compact an embankment properly without adequate compaction equipment. But there are many dreamers who hold that special compaction machinery would not be necessary if the fill-hauling vehicles were to follow a proper pattern across the embankment.

"This is a ridiculous piece of thinking," says Nomer Gray, partner in the consulting engineering firm of Ammann & Whitney, whose current Chantilly Airport job near Washington, D.C., includes a vast amount of compaction. "To begin with, a truck driver couldn't care less. Unless someone constantly stands over him, he's naturally going to drive in the ruts of the vehicle before him. Instruction to drive 1 ft to the left or right of these tracks is a waste of time and effort and has gotten meager results, in my experience."

In any event, it is not necessary to depend on the action of earth-hauling equipment to achieve proper compaction. Today there are well over 100 different items of commercially available machines or tools especially designed for compacting earth. There is some device built to suit nearly any job condition. And there is a trend toward units that are self-propelled.

Regardless of how it is powered or propelled, compaction equipment does its job in any one of four principal ways, or combinations of them:

- 1. Static weight
- 2. Kneading action
- 3. Vibration
- 4. Impact

Static-weight compactors are surface rollers of either the smooth-steel-wheel or pneumatic-tired type. The steel units may be two- or three-axle tandems or of the three-wheel configuration. Pneumatic-tired rollers come in a variety of sizes and weights; the differentiating point is the tire size.

Kneading-action compactors are primarily tamping rollers of the sheepsfoot type. But this category also includes grid rollers and steel rollers with segmental-pad drums.

Vibration compactors are vibratory steel or rubber-tired rollers, or vibratory plates or shoes.

Impact compactors are primarily hand-held pneumatic tampers. But some are self-contained gasoline-powered units that jump up and down. Still others resemble drop hammers.

Finally, there are combinations that are neither bird nor mouse and must be classified as bats.

#### Steel Rollers

Tandem rollers are those that have two or three rolls in line. The rolls are actually steel drums that can be filled with ballast to increase their weight. If a roller is described as "14-20-tons," it means that the minimum deadload weight of the machine is 14 tons and that the rolls can be ballasted with material such as water or wet sand to give a maximum total weight of 20 tons. It should be kept in mind that although total weights of tandem rollers can be greater than three-wheel rollers, their unit pressures tend to be less because the greater contact surface of the rolls will spread the load over a larger area.

Three-wheel rollers have two rear wheels and a front steering wheel. The narrow rear wheels and the wide front wheel may be either spoked or ballastable. The three-wheel roller is quite maneuverable but tends to leave deep ruts in granular soils due to the concentration of load in the narrow wheels.

Both types have rather slow running speeds and have questionable safety for operation near the edges of high, steep-sided fills.

Steel rollers of the tandem or three-wheel type are effective most generally on soils of a more granular nature where the crushing effect of their static weight can be best employed. However, loose sands may not support the heavier rollers.

A steel roller's compactive effort is lessened in material of granular-plastic or plastic-granular nature. That's beacuse the heavy rollers create crusting at the top of the layer, with diminishing effectiveness down to the lower parts of the lift, even in shallow thicknesses.

For very plastic material, steel rollers tend to have a bridging effect. This means that the roller



STEEL ROLLER-Tandem or three-axle type (here) compact granular soil.



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#### EARTH COMPACTION ... continued

will squeeze material from the high spots to the lows, but the material moved will not be compacted. Steel rollers also have a plowing effect. This creates plastic waves ahead of the rolls and also results in a springing up of material behind them.

Steel-wheel rollers can be used effectively to level off high spots after sheepsfoot or pneumatictired rollers have done their work.

E. Miller Smith, a compaction expert with S. J. Groves & Sons Co., one of the country's foremost earthmoving contractors, considers steel rollers as "possibly the oldest in design of all classes in use today. To use a common expression, the 'bugs' have been pretty well removed so that they contribute very little to downtime and maintenance costs.

"Very definitely they have their place in some locations. But they are losing favor on the largest of the earthmoving projects on embankment rolling, although they are used in many places for sealing-off the fill surfaces."

Twenty-nine states and the District of Columbia permit steelwheel rollers for compaction (CM&E, April, p.230). Only two states require that three-wheel rollers be used. New York specifies that steel-wheel rollers shall be used for compacting slag, coarse gravel, rock, or layers composed of soil and rock.

Weight requirements for steelwheel rollers vary from 8 to 10 tons for tandems and from 10 to 14 tons for three-wheel rollers. Required compression produced under the driving wheels runs from 275 to 330 lb per in. of roller width-a 20% variation.

One state requires that the roller combination include a threewheel roller. This may mean that the department is paying the cost of having idle equipment on the

comparative specification sheet listing manufacturers and



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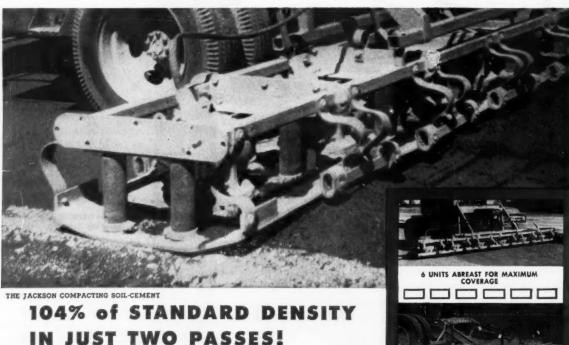
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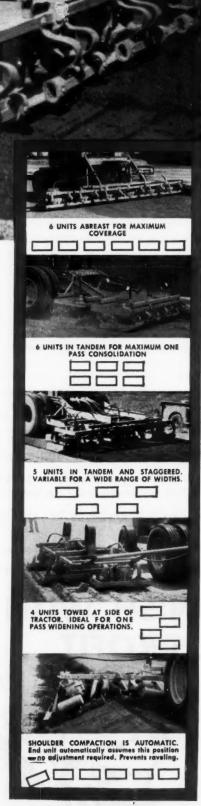
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#### JACKSON VIBRATORS, INC.



#### EARTH COMPACTION ...

features of steel rollers will appear in the next issue.

#### **Pneumatic-Tired Rollers**

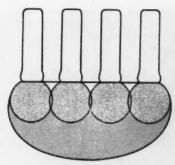
Pneumatic-tired rollers are surface rollers, yet they also apply the principle of kneading action. They are either self propelled or drawn, and are of two types: Those with small tires and those with large ones.

Small-rubber-tired rollers generally have two tandem axles with four to nine wheels each. The wheels are arranged so that the rear ones will run in the spaces between the front ones, theoretically leaving no ruts. The chassis of the piece is also a container for solid or liquid ballast. The weights carried may be varied to suit the material being compacted.

The individual wheels may be on knee-action type mountings to avoid omissions of low spots or bridging on highs. Wheels may also be mounted slightly out of line with the axle, giving them a weaving action and the name "wobbly-wheel." This condition improves the kneading action. It gives better routine compaction in all but very plastic materials, whereas the standard small-wheel compactor is suggested for finishing operations.

Pneumatic-tired rollers should not be overloaded with ballast or moved at excessive speeds. Such faulty operation will give more coverage but will result in extra tire and bearing wear, thus increasing maintenance costs.

Small-tire compactors provide the same unit surface pressure as large-tire units, with less over-all weight on the material being compacted. They provide more crushing of lumps, do not push whole masses before them, or cause lateral displacement. They also offer more maneuverability with less motive power. Disadvantage lies in poor flotation in loose materials, slipping of self-propelled units in very wet soil, and about a



PRESSURE BULB — Pressures of individual tires inter-react to form larger bulb deeper in the lift.

6-in. maximum depth of compactive effectiveness.

Large - tire rollers, generally towed, get into the realm of super-compactors or proof rollers. Most are from 15 to 50 tons in weight and are on large-diameter, large-section, rubber-tired wheels. Some heavy airport units having five or six wheels go up to 200 tons.

Large-rubber-tire rollers will work on all types of soils. They cover a bigger unit-pressure area

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PNEUMATIC-TIRED ROLLER-Trend with these units is self-propulsion.

and have a deeper effect on soil movement (due to less lateral support, percentagewise) than do small-tire units. Large-tire compactors can handle higher lifts and get deeper penetration of compressive force. But there is a definite variation, from the surface down, in resulting density. The expense is in their operation since they require the right type tractor to pull them, and they must make a greater number of passes to get complete coverage of the spaces between the wheels. Their best use is in test or "proof" rolling.

When considering a large-tire roller for general compaction work, the contractor should check the economics of getting the same unit loadings (in psi) with small-tire units used in more passes on shallower lifts. Advisable also is the consideration of gaining maximum results by using pneumatic units in concert with steel units where the soil types warrant.

There are at least four ways used to express the compacting ability of pneumatic rollers. They are: (1) gross weight of vehicle; (2) wheel or tire load; (3) weight per inch of tire width; and (4) tire inflation pressure. The problem is complex because rubber, unlike the steel roller, is flexible. And low tire air pressure allows an oval surface contact area to enlarge. This diminishes the effect of total load by giving larger weight distribution and, conse-

quently, lower unit ground pres-

Accordingly, gross-weight ratings mean nothing unless the number of wheels, tire size, and inflation pressures are known. Yet five states rate pneumatic rollers on the basis of gross weight only (CM&E, April, p. 226), with weight required ranging from 5 to 30 tons.

Seven states specify minimum or ranges of wheel loads that vary from 1,000 to 6,000 lb. But wheel loads do not express compacting ability unless the tire size and inflation pressure are also given. Wheel loads within a range of 1,000 to 2,500 lb, even when used with the smallest compactor tire now available, will not produce the compactive effort needed in modern highway construction.

Seventeen states rate the required pneumatic rollers by "weight per inch of tire width." Yet the ranges specified vary from a low of 43-300 lb to a high of 400-600 lb.

While the "weight per inch of tire width" applied to steel-wheel rollers gives a representative measure of compacting ability, the same criterion loses much of its meaning when applied to pneumatic tires. In the case of the steel-wheel rollers, a uniform rectangular ground contact pattern exists under most conditions. On the other hand, the oval contact pattern produced by a tire changes

as wheel loads and inflation pressures vary. In general, the tire contact length changes to a greater degree than the tire contact width. If the weights per inch of tire width are converted into wheel loads at various inflation pressures, a sizeable range of contact pressures results.

Tire sizes also have an influence. For example, a requirement of 600 lb per inch of tire width could be converted into a contact pressure of 62.0 psi for one tire size and a contact pressure of 81.6 psi for another. This means a differential of more than 30% in compacting effort.

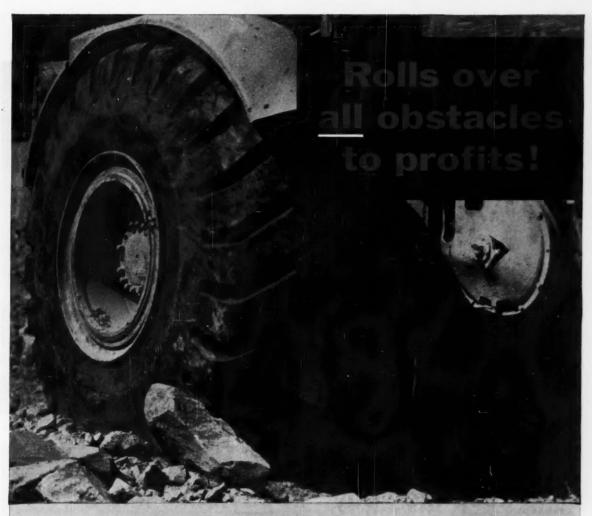
Only three highway departments' standard specifications have no provisions which allow use of pneumatic rollers for compacted embankment work.

Several states specify the tire inflation pressure. Again, this is of no significance without tire size and wheel load. Contrary to popular belief, inflation pressure and contact pressure are not necessarily synonymous.

A comparative specification sheet listing manufacturers and features of self-propelled pneumatic-tired rollers will appear in the next issue.

#### Sheepsfoot Rollers

For cohesive materials (clays and silty clays) the proper compaction equipment is the sheepsfoot roller: This is the tamping unit that produces kneading action in the soil. Sheepsfoot rollers range from about 2 to 20 tons in weight. The average unit is about 6 ft wide. The drum, close to 5 ft in dia, is hollow and ballastable to increase the load. The rollers can be towed in pairs, or fourblock pairs, or other arrangements. Feet, about 7 to 12 in. in length, have various shapes: round, pie-segment, diamond, or elliptical. There has been no research on which is best, but the compacting surface should be 5 to 10 sq in. in order to meet va-



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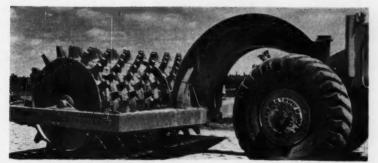
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SHEEPSFOOT ROLLER-Steel feet "walk out" when lift is compacted.



SELF-PROPELLED SHEEPSFOOT—Outsize unit covers large area fast.

#### EARTH COMPACTION . . . continued

rious state specifications for contact pressures.

The sheepsfoot roller usually can handle loose lifts up to 10 in. The theory is that the feet will compact the lower layers in successive passes until, when completely packed, the soil will yield no further and cause the roller to "walk out." Because the feet penetrate the lift and compact within it, they affect the soil particles in all directions. It is not necessary that the roller drum touch the surface, since the total load is transmitted to the soil by the feet in small areas at high concentrations.

Disadvantage here is the comparatively shallow depth to which the feet can effect compaction. Also, they have no effect in granular materials. The Corps of Engineers, for its large scale work,



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THE LIFKIN RULE COMPANY

#### EARTH COMPACTION . . .

has developed some huge machines with larger feet. But they apparently increased the motive power required without any significant increase in effective compaction depth.

In some cases sheepsfoot rollers will bridge over the soil at the outset, but this bridging stops after several passes. They do expose more soil surface to the air



TRICYCLE-Separate engine drives each drum of this unit.

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#### FROMMEYER & CO.

PHILADELPHIA provides its laborers with the power to produce. PRIME-MOVER is made specifically for laborers' use — to triple their output in handling of materials. Here is an immediate and positive way to cut costs. Why not do as this alert contractor is doing? Give your laborers the power to produce. Write for job estimating data and performance reports.

A PRIME-MOVER places from 12 to 17 cubic yards per hour on the average pour.



THE PRIME-MOVER CO.

PRIME-MOVER

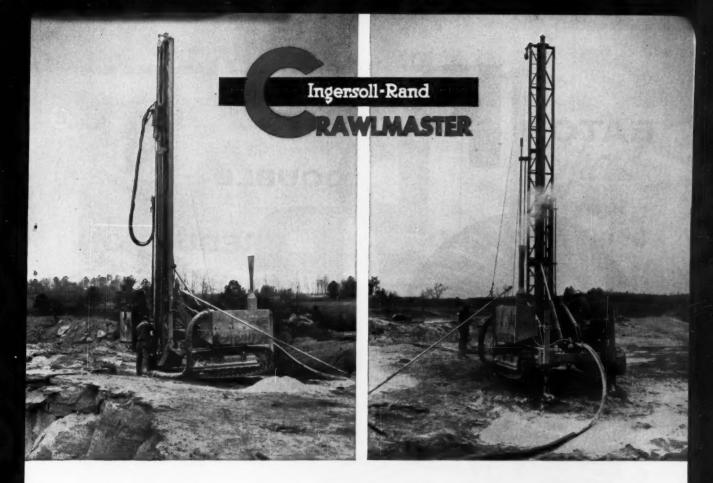
MUSCATINE, 10WA

for evaporation of moisture, causing crusting. Their penetrating feet pulverize lumps in the soil. And they work well by causing lateral particle movement beneath the surface, thus blending coarse and fines more thoroughly. On the other hand, sheepsfoot rollers should not be used in graded aggregate or stone bases, since there they will cause segregation.

Twenty-nine states have specific requirements for sheepsfoot or tamping rollers: They spell out the general type, area of tamping feet, and/or psi of contact area needed (CM&E, April, p.226). Another six states permit tamping rollers if approved by the engineer. In one state tamping rollers are permitted as a contractor's choice, and another twelve states are also on an end-result requirement. Seven states require dualdrum rollers. Five states require self-cleaning features for tamping rollers.

Thirty-three awarding agencies have ground-pressure requirements expressed in minimum psi or minimum weight per foot when the entire weight of the roller is supported by one row of feet. The range of minimum contact pressures on the tamping feet varies from 100 to 500 psi. But 16 states call for a minimum 200 psi. Where the maximum contact pressure is specified, the range is from 175 to 550 psi.

continued on page 173



### NEW heavy-duty crawler drill

MOST RUGGED—tons of sound design
MOST POWERFUL—outperforms 5½" drills
MOST VERSATILE—4" to 6½" holes, vertical to horizontal

The new Ingersoll-Rand Crawlmaster is a multi-purpose machine that meets every requirement for percussion, rotary or Downhole drilling of 4" to  $6\frac{1}{2}$ " blast holes in any type of ground. Here are just a few of its outstanding features:

Constant-Pressure, Double-Acting Hydraulic Feed—smooth, infinitely-variable power for drilling pressure or pulling stuck steels. Drill won't jump ahead in pockets or fissures.

Simple Hydraulic Control Of All Tower Positions. Tilting of tower on yoke and raising or lowering of yoke hydraulically powered by separate cylinders. All throttles outfront for easy operation.

Throttle-Controlled Reverse Rotation permits fast uncoupling of steels without having to climb tower to reverse drill.

Ejector-Type Dust Collector has no moving parts to wear out or maintain. A simple air-jet does all the work.

Heavier-Extra weight is reflected in sound design as-

suring extra stamina for the toughest drilling jobs. Has rugged, tractor-type crawlers with enclosed gear drive.

Four 30" Stroke Hydraulic Leveling Jacks permit accurate tower positioning with maximum stability on rough

Hoist, Rod-Changer And Hydraulic Wrench greatly simplify addition or removal of steel sections.

Interchangeable drills and rotation units permit one machine to be used for percussion, rotary or Downhole drilling of 4" to 6½" holes, taking power from a 600 or 900 cfm portable compressor. For a new high in drilling speed and economy, ask your

I-R engineer for the Drillmaster story. Or send for Bulletin 4211.





## EATON

REDUCTION

DOUBLE

SAVE WEIGHT
LAST LONGER
REDUCE MAINTENANCE



SECOND REDUCTION
in planetary gears

Eaton PDR Axles have established outstanding performance records in all types of heavy-duty operation. By actual comparison, they cost less to buy, less to maintain.

Ask your truck dealer for complete information about Eaton PDR Axles.

Because Eaton PDR Axles weigh less (size for size) than conventional herringbone or spur gear axles, PDR-equipped trucks haul more legal payload.

Two exclusive Eaton design features contribute to materially longer axle life: Gear tooth loads are distributed over four rugged "planet" gears, reducing stress and wear; the Eaton forced-flow lubricating system provides positive lubrication to all moving parts, even at slowest vehicle speeds.

Simple construction—similar to the famous Eaton 2-Speed Axle which is familiar to all truck servicemen—holds maintenance cost to a minimum. Repair parts are readily available—many of them interchangeable with other Eaton Axles.



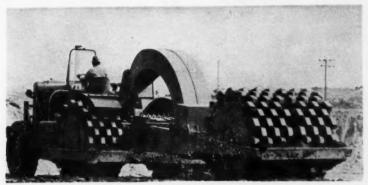


More than Two Million Eaton Axles in Trucks Today

EATON

AXLE DIVISION -

MANUFACTURING COMPANY
CLEVELAND 10, OHIO



SHEEPSFOOT VARIATION - Sloped-pad tamping feet do the compacting here.



TRACTOR COMPACTOR-The segmented steel rolls replace rubber tires.

There is a trend toward self propulsion of sheepsfoot rollers. Both R. G. LeTourneau Inc. (Longview, Tex.) and Ferguson (Shovel Supply Co., Dallas) have built large four-drum units for heavy compaction work. The latter also has produced self-propelled two-drum rollers of various configurations.

A somewhat different variation of the sheepsfoot roller is made by Hyster Co. (Peoria, Ill.). They replace the rear wheels of a Cat DW20 prime mover with steel-drum wheels fitted with sloped-pad tamping feet. Also, hooked to the unit by a gooseneck are two trailing compaction drums.

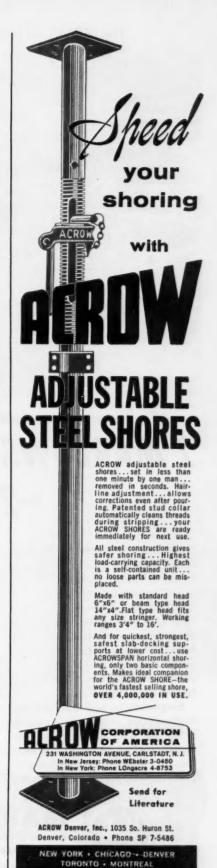
Another Hyster variation is the "grid" roller. Here the DW20's rear wheels are replaced by wheels whose perimeter is made of an open mesh of 1½-in.-wide steel bars on a 5-in. square spacing. Similar grid drums can be hooked behind the DW20 or towed sepa-

rately. Eskridge Eqpt. Co. (Tulsa) makes a somewhat similar towed "grate" roller. The grid roller pulverizes subsurface lumps and works well in gravel or rocky fill.

Buffalo-Springfield Co. (Springfield, Ohio) manufactures a 16-ton self-propelled segmented-wheel roller that combines the features of sheepsfoot and steel wheel rollers. They also make a segmented roll that can be substituted for the guide roll of a regular steel roller. And Clark Equipment Co. (Benton Harbor, Mich.) and Wagner Tractor Co. (Portland, Ore.) have segmented rolls that can be substituted for the rubber-tired wheels of their large tractors.

#### **NEXT MONTH**

The discussion of compaction equipment will continue in the next issue. Vibratory and impact type equipment will be covered. Included will be two tables that the contractor can use to help him decide which type of compactor will suit.



The HEART of seepage water control is the PUMP on the job!



## 2 MARLOWS PUMPED 360,000 GPH -24 hours a day!

When work was started on the main channel improvement at Galop Island in the St. Lawrence River, it was necessary to reduce flow by diverting water through a relief channel. This channel was dug on the American mainland near Red Mills, New York. When the excavation was started, a cofferdam was built at the upstream end of the job to hold back the water.

Seepage water became a problem as the digging progressed to a grade below the level of the river. For seepage control, Morrison-Knudsen Co., Inc., installed two Marlow selfprimers. The pumps were located at a collecting basin at a low point of the excavation. One 10-inch pump was set on the bank, while a second unit was placed on a raft in the basin! Both pumps were used during peaks to carry water over the 30-foot embankment into the river. The pumps, with a combined capacity of 360,000 GPH on continuous service, can actually handle up to 400,000 GPH in emergencies.

In addition to a complete line of AGC rated pumps, Marlow also builds the famous "Mud-Hog" diaphragm pump. For full information write today for Bulletin C-09 and the name of your Marlow dealer.



Two Marlow self-primers pump water from a collecting basin up a 30-foot bank.



This Marlow pump operated on a 24hour schedule to control seepage water.



#### MARLOW PUMPS

DIVISION OF BELL & GOSSETT COMPANY MIDLAND PARK, NEW JERSEY

Morton Grove, Illinois . Longview, Texas

0-471

Ask the man who's ahead of schedule

...no one makes a tougher tooth than EACO

The right design, the right steel, the right shape make *ESCO* Two Piece Teeth right for every digging condition.

The earth moving industry looks to



Electric Steel Foundry Co., PORTLAND, OREGON

See reverse for shapes and size range



#### 12M ALLOY STEEL

ESCO 12M Two Piece Teeth are the toughest you can use. Developed through years of research for the earth moving industry, cast ESCO 12M is the finest steel made for severe shock and abrasion.

#### **ESCO TWO PIECE TEETH** for all your digging equipment

Your ESCO dealer can supply two piece teeth for all your equipment. Consult him about standardizing on ESCO teeth for the added advantages of quality purchasing and reduction of on-the-job inventories.

**WEAR CAP ADAPTERS** 

The ESCO Wear Cap Adapter, winner of the Blue Ribbon Mining Award, is the most rugged tooth assembly ever developed for handling tough rock and taconite. Replace-

able wear caps sharply increase service life by protecting

the adapter from wear. No special pins or welding required.



#### FOR EVERY DIGGING CONDITION



GENERAL PURPOSE





ROCK PICK



PICK



SHARP FLARED



SHARP



SHARP LONG



RIPPER

**Electric Steel Foundry Company** 2149 N W 25TH AVE . PORTLAND 10, OREGON

MFG. PLANTS AT PORTLAND, ORE, AND DANVILLE, ILL ESCO INTERNATIONAL NEW YORK, N. Y. . IN CANADA ESCO LIMITED



#### Construction Men in the News...

#### Merritt



MYLES C. McGOUGH



SHERMAN H. SERRE



FRANK R. CREEDON

MYLES C. MCGOUGH is the newly elected executive vice president of Merritt-Chapman & Scott in charge of the firm's construction department. He is one of three executives elected to new positions of responsibility.

SHERMAN H. SERRE, in charge of Merritt's Great Lake's construction division, is now a senior vice president.

FRANK R. CREEDON, a construction manager, is a newly elected vice president.

McGough suceeds William Denny who is retiring after 32 years with MC&S. The position carries with it the responsibility for a variety of domestic and overseas construction projects that range from four dams in the United States to a paper mill and pipeline projects in Israel and Iran.

McGough joined Merritt in 1936 as a project engineer and became a vice president in 1946. He has directed industrial, heavy, and marine construction jobs.

He is a graduate of the University of Pittsburgh with a degree in civil engineering.

Serre will be in charge of all MC&S dredging operations in addition to construction in the Great Lakes area. He maintains offices in Cleveland and Chicago.

Serre has been associated with Merritt since 1925 and in charge of Great Lakes construction operations since 1937. He was elected a resident vice president in 1947 and an MC&S vice president in 1952.

Creedon joined Merritt in 1955.

Current projects under his direction include two portions of the Niagara Power Project, the main generating plant at Lewiston and the intake structures and sections of twin conduits at Niagara Falls.

From 1952 to 1953, Creedon was Director of Installations for the Defense Department, supervising construction of military public works projects by the Army, Navy, and Air Force. He was awarded the Medal of Merit, the nation's highest civilian honor,

for his services in World War II, including participation in the Abomb project. He was resident general manager during 1944-45 for the engineering company constructing the atomic energy plant at Oak Ridge, Tenn. Subsequently, he was manager of design and construction during erection of the Atomic Energy Commission installation at Hanford, Wash.

Creedon has a degree in civil engineering from the Massachusetts Institute of Technology.

#### Perini



W. A. ROSE is the new executive vice president and general manager of Perini. He has been associated with the firm since 1956 when he became president of Majestic Contractors, Ltd., Perini's pipeline division. He will continue as president of Majestic in addition to his new duties.

Under Rose's direction, Majestic, a Canadian company, has laid hundreds of miles of natural gas transmission and distribution lines plus oil pipeline and gathering systems. Majestic's two wholly-owned subsidiaries, Majestic Contractors, Inc., and Majestic Contractors International, Ltd., have worked in the United States and overseas.

Rose's pipeline experience began in 1944 when he joined Anderson Brothers, pipeline contractors. Two years later he was vice president in charge of field operations, and in 1952 he became executive vice president and general manager. During his tenure, the firm worked in the United States, Canada, and overseas.

In his new position, he will help administer heavy, marine, and building construction in many parts of the world.

continued on next page

## atlas COMPO FORMS



#### More Money-Saving Features Than Any Other Concrete Form

Learn why these lighter, stronger, more accurate forms can be erected and stripped with maximum speed and economy.

New Atlas Compo Forms will save time and money on practically any concrete structure square, round or other — low or high.

Write for new descriptive folder CME-60.

#### IRVINGTON

**FORM & TANK** 

CORPORATION

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#### The Moles



CHESTER W. CAMBELL, president and chief executive officer of The Foundation Co., is the newly elected president of The Moles. He succeeds Mansell L. MacLean, president of MacLean-Grove & Co., Inc.

The organization of heavy-construction men also elected other officers at its annaual meeting in New York City. Harry T. Immerman of Spencer, White & Prentis is the first vice president; Eugene G. Rau of J. Rich Steers, Inc., is second vice president; Joseph B. Diamond, an attorney, is treasurer; Eugene F. Moran, Jr., of Moran Towing Corp. is secretary, and H. Austin Van Name of H. A. Van Name Engineering Co. is sergeant at arms.

Five new trustees were also named. They are William J. Green of S. J. Groves & Sons Co., Edward J. Johnson of Moran Towing, Gilbert M. Serber of Stock Construction Corp., and Edward G. Armitage of Armitage & Co. Inc.

Cambell has been president of The Foundation Co. since 1956. He joined the company in 1926, then left it for ten years to work for the Federal Emergency Administration of Public Works and the Department of Housing and Building of New York City.

#### Stone & Webster

WILLIAM L. SHEETS, vice president of Stone & Webster Engineering Corp., is the newly appointed construction manager of the engineering and construction firm. In his new capacity he will administer construction activities in the United States and overseas.

Sheets joined Stone & Webster in 1929 as an instrument man. He worked successively as a resident engineer, project engineer, general superintendent on construction projects, and construction manager. He was elected a vice president in 1958.

#### Long



BLUFORD R. SLOAN is project manager for Long Construction Co. on one of the largest lift-slab projects ever built in the United States—a twin 15-story apartment house project under construction in Ann Arbor, Mich. (CM&E, April, p. 166).

Sloan has been with Long for 10 years. His experience with lift-slab projects began with the construction of the Rouge Plant Administration Building for the Ford Motor Co. in Dearborn, where he started as an iron-worker foreman and rose to project superintendent. He has participated in the construction of lift-slab warehouses, office buildings, churches, and schools.

#### Massman

H. J. MASSMAN, III, is now executive vice president of Massman Construction Co. of Kansas City, Mo. He joined the firm in 1956 and has been a vice president since 1957.

JOHN T. MASSMAN, formerly assistant secretary, has been named a vice president in charge of the firm's river and quarry opoperations. He has also been a member of the firm since 1956.

ROBERT J. MASSMAN, who joined the firm in 1958, has been appointed field safety director, a newly created position.



## This great new "construction man's" WHITE carries 3,000 to 4,000 lbs. more payload in most states

This new White 6264 boosts allowable payload in a majority of states—by thousands of pounds more than conventional trucks!

More weight is forward. Compact, one-man cab with side-mounted engine means a larger CA with front-axle loadings up to 18,000 pounds! And extensive use of lightweight aluminum cuts chassis weight . . .

boosts payloads as much as 19%.

The all-new 6264 is the "construction man's truck." More rugged, with deep frame rails of heat-treated alloy steels. Wide-track wheels for more maneuverability. Up to 85% greater visibility. Up to 5 feet shorter turning radius than conventional trucks! And far greater accessibility to the economical Super Mustang engine.

Ask your White representative about the exact payload advantages for your own state. See for yourself how this custom-engineered White 6264 gives you a competitive edge. It means more work, better schedules, more earning power!

THE WHITE MOTOR COMPANY
CLEVELAND 1, OHIO
Branches, distributors, dealers in all principal cities

WORLD LEADER IN HEAVY DUTY TRUCKS



...60 YEARS OF LEADERSHIP

WHITE

## PAYLOADER® with 4-in-1 bucket





## "We like the mobility and versatility"

SAYS LOS ANGELES CONTRACTOR

Mr. C. J. Rounds, Jr. of C. J. Rounds Co. is speaking about their Model H-90 PAYLOADER tractor-shovel with Drott 4-in-1 Bucket that has served several months on this 1½-million-dollar contract with the Los Angeles Flood Control District.

It has performed a large variety of different work on this contract such as fine grading, bulldozing, backfilling, truck-loading, pulling piles and loading brush according to excavating foreman, Ray Brookins, who adds, "It's a fine machine." Operator R. J. Mann says, "I can do much more with the 4-in-1 bucket than with a regular skip."



Patented Drott 4-in-1 Buckets are available only on "PAYLOADER" tractor-shovels in the rubber-tired class.

## "We like its durability"

SAYS NEW YORK CITY CONTRACTOR

"The H-90 PAYLOADER with 4-in-1 bucket is very efficient," says Robert V. Rusciano, general superintendent for the prime contractors, Rusciano Construction Corp. and Del Balso Construction Corp. on this 5½-million dollar section of Interstate Highway 87.

"We especially like it for close-quarter work, its durability for rough material handling, and the clean dumping action of the bucket. The H-90 has very good maneuverability giving fast operation with minimum hold-up of moving traffic that we often have to contend with."

HOUGH, PAYLOADER, PAYLOGGER, PAYMOVER and PAY are registered trademarks of The Frank G. Hough Co., Libertyville, Illinois.

NEW LITERATURE: The H-90 is one of many proven "PAYLOADER" sizes, and the Drott 4-in-1 Bucket is one of many unusual Attachments available for use on them. A new brochure covering all these "PAYLOADER" models and Attachments is available for the writing.



## HOUGH\*

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY



THE FRANK G. HOUGH CO. 706 Sunnyside Avenue, Libertyville, III.

Send brochure on all "PAYLOADER" models, and attachments for them.

Name
Title
Company
Street
City State



## HERCULES® ELECTRIC BLASTING CAPS HELP SET WORLD'S RECORD IN TUNNEL DRIVING

"Setting a world's record," says Clancy O'Dell, project manager of the recently holed-through New York City's West Delaware Tunnel, "is largely a combination of loyal skilled tunnel workers and the best and most dependable equipment and supplies." And he should know, for the boring of this 43.64-mile-long water tunnel was finished in the record time of 841,000 man-days, or ten months ahead of schedule.

On this project, the West Delaware Tunnel Constructors also drove a record 2,177 linear feet in a single 31-day period and established a shaftsinking record of 243 linear feet for a like period.

Hercules® Short-Period Delay Electric Blasting Caps, used almost exclusively in all phases of blasting activity on the West Delaware Tunnel, proved their dependability and efficiency in helping to establish these records.

For complete information on how No Vent® Short-Period Delay Electric Blasting Caps can be applied to your job, call your Hercules representative or write direct to the office nearest you.

**Explosives Department** 

### HERCULES POWDER COMPANY

900 Market Street, Wilmington 99, Delaware

BIRMINGHAM, ALABAMA · CHICAGO, ILLINOIS · DULUTH, MINNESOTA · JOPLIN, MISSOURI · LOS ANGELES, CALIFORNIA NEW YORK, NEW YORK · PITTSBURGH, PENNSYLVANIA · SALT LAKE CITY, UTAH · SAN FRANCISCO, CALIFORNIA

### Sales and Service

Equipment purchasing and servicing takes less time when you know who and where to call. Keep advised of new distribution, sales personnel and other activities.

#### Distributor Appointments

Westinghouse Air Brake Co.: The Le Roi Division has appointed Summers Road Machinery Co. of Columbia, S. C., and George C. Gilbert, Inc., of Kingston, N. J., as distributors of the Le Roi S2 line of stationary air compressors.

Koehring Co.: The Kwik-Mix Division has appointed Star Machinery Co. of Seattle, Wash., as distributor. The Buffalo-Springfield Division has appointed Mitchell Distributing Co. of Charlotte, N. C., as distributor. The Koehring Division has appointed Pelican Machinery Co. of Shreveport, La., as distributor. The Parsons Division has appointed Pelican Machinery Co. of Bossier City, La., and Wood Tractor Co. of Portland, Ore., as distributors.

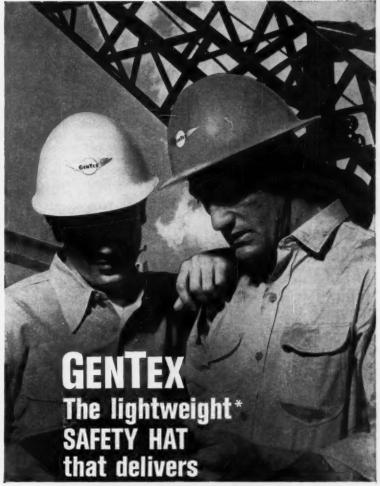
Olin Mathieson Chemical Corp.: Ramset Fastening System of the Winchester-Western Division has appointed Ram Tool Co. of Pittsburgh as distributor of its powder-actuated tools.

D. W. Onan & Sons Inc.: Onan Eastern Corp., an independent corporation, is the new Onan distributor in New York City, northern New Jersey and Connecticut.

Schramm, Inc.: Harris Euclid Co. of Sioux Falls, S. D., has been appointed dealer for portable compressors and penumatic construction tools.

The Warner & Swasey Co.: The Powers, Mich., branch of the Wisconsin Industrial Truck Co., Milwaukee, has been named Gradall and Hopto distributor for all counties in the Upper Peninsula of Michigan.

Young Spring & Wire Corp.: The Daybrook Hydraulic Division has appointed the following distributors: Olivier & Son of New Bedford, Mass.; Owens Body &



## IMPACT RESISTANCE better than 40 foot-pounds

AND PENETRATION RESISTANCE less than 1/4" penetration in 10 ft.-pound plumb bob test (Federal specs allow 3/8")

## PLUS DIELECTRIC RESISTANCE

### AND ALL DAY COMFORT

Exclusive no-wrinkle headband conforms to head contour, eliminates pressure on temples. 6-point suspension system, designed on same principle as jet pilot helmets, keeps hat in positive balance always—no more end-of-shift strain and fatigue. POLY-ETHYLENE shell won't crack at brim or crown when dropped—even on concrete. Smooth, modern design with choice of 9 colors impregnated right in the plastic for handsome appearance and instant job classification. Snap-in nylon and plastic headband with fingertip control, fully washable. Adjustable, self-storing chinstrap and winter liners available. Brim and peaked-cap models. \*12½ oz. to 12% oz., depending on impregnated color pigment. We would be pleased to submit full details and a hat for texting—just drop us a note on your company letterhead.

Foremost manufacturer of helmets for military, industrial, civic and sports use.

GENTEX CORPORATION, 450 7th AVE., NEW YORK 1

## "GJ-BOSS



## so Relial FOR PILE DRIVING

...AND ANY STEAM, AIR, WATER AND HYDRAULIC SERVICES. HIGH OR LOW **PRESSURE** Washerless



Unequalled for safety, efficiency and long service life. Ground-joint union between stem and spud provides leak-proof, troublefree seal ... no lost or worn-out washers to replace. All parts malleable iron or steel, rustproofed. Furnished with superstrong "Boss" Offset and Interlocking Clamps. Sizes 1/4" to 6", inclusive.

#### COMPANION MALE COUPLING "BOSS" STYLE MX-16

Companion coupling for "GJ-Boss", described above, and "Boss" Washer Type Couplings Style W-16. Each size fits same size hose ... oversize hose not required. Furnished with "Boss" Offset and Interlocking Clamp. Sizes 1/4 " to 6 ", inclusive.

#### "BOSS" HOSE MENDER, STYLE BM-16



The practical, safe way to restore damaged hose to service. Fitting consists of corrugated mender tube and two "Boss" Interlocking Clamps. Tube has flanges to engage clamp fingers. Thoroughly rustproofed. Sizes 1/2 " to 6"

Stocked by Manufacturers and Distributors of Industrial Rubber Products

## Valve & Coupling Co.

#### SALES AND SERVICE . . .

continued

Equipment Co. of Casey, Ill.; and Simmons Garage & Equipment Co. of Lexington, Ky.

#### On the Sales Front

Blaw-Knox Co.: John Bodziuch has been named engineer in charge of sales of heavy steel forms for use in the construction of concrete bridges, dams, and concrete lined tunnels in the central United States area.

McKiernan-Terry Corp.: Nile E. Sweet has been named western sales manager in the Chicago sales office of the Mead-Morrison Divi-

Flygt Corp.: Roger K. Warren has been appointed district sales representative and will direct sales of Flygt electric submersible pumps in Lower Michigan, Indiana, Kentucky, Ohio, and Western New York.

Quick-Way Shovel Co.: Paul J. Wolfert has been appointed director of sales for the company.

R. G. LeTourneau, Inc.: Lee E. Jorgenson has been named to the sales staff of R. G. LeTourneau. He will work with contractors in Wisconsin, Illinois, Michigan, Indiana, Ohio, Iowa, Minnesota, Missouri and Nebraska.

The Heltzel Steel Form and Iron Co.: J. W. Coppock, Jr., has been appointed regional representative for the Southwest.

Buck Equipment Co.: A. C. Grant has been named general sales manager of the company.

Eastern Gunite Co.: Fred J. Bryant has been appointed vice president of the newly-created Structures Stabilization Division. The new division will concentrate on projects involving grouting for foundation stabilization, stone masonry restoration, floor jacking, and water control. Coverage will be nation-wide.

#### In the Main Office

Ceco Steel Products Corp.: Ned A. Ochiltree has been elected chairman of the board. C. Foster Brown, Jr., formerly executive vice president, replaces him as president.

continued on page 187



LESCHEN WIRE ROPE DIVISION H. K. PORTER COMPANY, INC.

#### Useful Information

These Construction Methods reprints contain valuable information for contractors. Send your requests to:

> Editor, Construction Methods 330 West 42nd Street New York 36, N.Y.

#### PAVING

How to get the best results

#### EARTHMOVING

An art and a science

#### PRESTRESSED CONCRETE

CONCRETE MIXING AND PLACING

Any of the above 50¢ each, 10 or more, 40¢ each

#### PRODUCING AGGREGATES

60¢ each, 10 or more, 50¢ each

EQUIPMENT MAINTENANCE GUIDE 50d each

1959 COMPARATIVE SPECIFICATIONS SHEETS ON:

- d. MOTOR GRADERS
  b. CRAWLER TRACTORS
  c. COMPRESSORS
  d. SELF-PROPELLED SCRAPERS
  e. TRACTOR-DRAWN SCRAPERS
  f. STEEL ROLLERS
- 9. PNEUMATIC-TIRED ROLLERS

10¢ each, 10 or more, 8¢ each

Put your finger

**NEW, PROFITABLE** READY MIXED CONCRETE MARKET

... Sell concrete for highway construction with a BUTLER HP-85 Portable Ready Mixed Concrete Plant

**READY MIXED OPERATORS** . . . Take advantage of the swing to ready mixed for highways. It's a new source - an additional source — for substantial profits.

And the highway contractor will welcome you as a prime contributor to greater earnings in his pocket. Here's why:



With his purchase of ready mixed concrete from you, he eliminates a \$50,000 dual drum paver.



And he eliminates a high-priced, 5 man payer crew



as well as a batching plant and batch trucks.



With concrete from your completely automated BUTLER HP-85 Portable Plant, the contractor gets a uniform, inspector-pleasing, non-segregated mix, pin-pointed to any specfication -



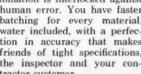
and he speeds up his job with less supervisory headaches and over-

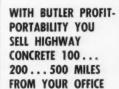
#### Production up to 200 cubic yards an hour

A Butler HP-85 Portable Ready Mixed Plant, completely automated, equipped with two turbine-type mixers, easily charges your transit mix trucks at the rate up to 200 yards an hour. That's enough to keep ahead of any highway demand - without a single bead of sweat.

And Butler simplified, in-place, quickconnected automation is interlocked against

human error. You have faster batching for every material, water included, with a perfection in accuracy that makes friends of tight specifications, the inspector and your contractor-customer.





Here's a picture story of transport and erection - the ultimate in portability.

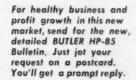
- The compart-mented bin sec-tion ships complete with lugs attached for crane lift.
- Batcher section is a complete unit with all piping, wiring, batchers and auto-matic controls in-place, ready for plug-in.
- Mixer section is also a complete unit with two turbine mixers, gates and controls pre-installed. Circuitry is completed with plug-in quick connec-tors. Support columns ship separately. These are quickly pinned to the mixer plat-form and swing into place as the mixer section is raised.



On a highway job, a move to the next section is made as quickly as with a batching plant - in fact faster than most.









CONCRETE

#### BUTLER BIN COMPANY

949 Blackstone Avenue

Waukesha, Wisconsin

## A small fable with a large moral



Farmer owned a sleek Jersey cow.

He milked the cow every day,
and his children drank every drop.

One day a neighbor said to him:



"Charlie, my cows give more milk than I need.

I'll sell you a bucket a day very cheaply, and you won't have to bother with milking any more."

The Farmer had a nose for bargains.

He accepted the deal. Instead of milking twice a day, he had more time to watch TV.

Then one day his neighbor's wife had triplets.

They no longer had any milk to spare.

The Farmer tried to milk old, faithful Bossy,

but—alas—she had dried up.

MORAL: If you don't milk the cow you have, some day you may be awfully thirsty.

Whether you're a farmer or steel buyer, your safest, most reliable suppliers are right here at home. No one knows the needs of American steel buyers better than American steel makers. To serve you, and serve you well, is our primary concern—not just today and tomorrow—but year after year.

For quality steel of certified analysis, meeting the appropriate specifications, you can rely on Bethlehem

Steel for such products as reinforcing bars, wire and wire products, pipe, structural shapes, plates, carbon bars . . . hot-rolled, cold-rolled, and galvanized sheets . . . transmission towers and other fabricated steel, wire rope, and industrial fasteners.

And remember, our engineers are on call to help you solve your steel-working problems.

### BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.



for Strength
... Economy
... Versatility



#### SALES AND SERVICE . . .

continued

Allis-Chalmers Mfg. Co.: J. D. Greensward has been elected president of Canadian Allis-Chalmers, Ltd., a wholly-owned subsidiary. He succeeds Harold M. Schudt, who has been named director of manufacturing, Allis-Chalmers International. The company has plants in England, Mexico, Italy, and Australia.

Timken Roller Bearing Co.: W. R. Timken has been elected president of the company. He replaces D. A. Bessmer, who resigned because of ill health.

#### Associations

Hoist Manufacturers Association: The following officers have been elected: persident, Herbert W. Gledhill, Jr., of Shepard Niles Crane & Hoist Corp.; vice president, Fred E. Rau, of Yale & Towne Mfg. Corp.; director, Weldon C. Miles, of the American Engineering Co.; director, Raymond A. Davies, of Chester Hoist; and director Edward J. Byrne, of Chisholm-Moore Hoist Co.

American Concrete Institute: The following officers have been elected: Joe W. Kelly, president; Raymond C. Reese, vice president, and A. Allan Bates, Bruce E. Foster, Ben C. Gerwick, Jr., and James A. McCarthy as members of the board of direction. At the annual meeting, honorary membership in the Institute was conferred on Professor Charles H. Scholer of Manhattan, Kan. and William Lerch, of Chicago.

#### **Special Mention**

Barber - Green Co.: Barber-Green Co. and Smith Engineering Works have approved a proposed merger of the two companies. The merged company will operate under the name of Barber-Green, under its present officers, with the addition of Gerald L. Smith and Donald D. Barnes as vice presidents and members of the board of directors.

Chain-Belt Co.: Spanall of the Pacific, Inc., western and Alaskan marketing firm for Spanall horizontal shoring, has been sold to Rex-Spanall, Inc., a subsidiary of the Chain Belt Co. Rex-Spanall has appointed Burke Concrete Accessories, Inc., as Pacific Coast distributor.



## It's Jaeger's new 3" pump...the "3PN" Out-performs all previous models

Pumps all the water a 3" suction hose can handle. With 4" suction hose pumps 28,000 gph at 10' lift. Surepriming is correspondingly fast, at all practical lifts.

#### AND LOOK HOW EASY TO MAINTAIN!

Suction chamber and liner are removable for quick adjustment, rotation or replacement of liner plate. (New Model 3XPN offers same feature in a smaller pump.) See your Jaeger distributor or send for catalog.



THE JAEGER MACHINE CO., 800 Dublin Avenue, Columbus 16, Ohio
AIR COMPRESSORS • MIXERS • PAVING, SPREADERS and FINISHERS



## NEFD A BACK·UP ALARM?

he has a mechanical one —
that works better, is less
costly, easier to install, and
takes no maintenance.
Pick up your phone right now,
or write for literature.



E. D. BULLARD COMPANY SAUSALITO, CALIFORNIA

### Construction Equipment News ...



#### Wheel-Mounted Side Boom Tractor

Four-wheel steering and four-wheel drive give this side boom tractor good maneuverability and good traction under all types of work conditions. In addition, the right and left hand brakes can be controlled independently or simultaneously to help keep the turning radius to a minimum. High-flotation tires permit the tractor to work on city streets

and highways without damage to the pavement. The FWD Blue Ox-Side Boom is equipped with a hydraulically controlled counterweight. Lifting capacity is 17,500 lb. On the job the rig can creep

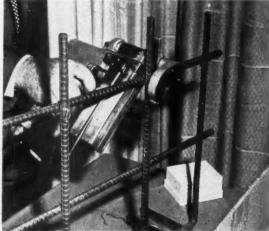
capacity is 17,500 lb. On the job the rig can creep at ½ mph, but on the highway it moves at a top speed of 47 mph. Dozer blade and hydraulic stabilizers are optional.—FWD Corp., Clintonville, Wis.



#### **Big Ripper for Skid Shovel**

Curved shanks on the Greenville TD-20 ripper swivel 15 deg to either side and penetrate to a depth of 24 in. The ripper mounts on the Drott K-3 skid shovel and handles one, two, or three shanks. Pitch and depth controls place and hold the point at any depth up to the 24-in. maximum. All shanks have replaceable points.

The tool beam is 102 in. wide and is of box type construction. Bearing surfaces are provided where swing brackets are attached. A pump delivering 44 gpm operates the hydraulic system. The crawler's pto drives the pump.—Greenville Steel Car Co., Greenville, Pa.



#### **Air Tool Ties Reinforcing Bars**

Workmen placing reinforcing steel now can make 40 to 50 ties per minute with a small, air-operated tool. The tool, or gun, weighs only  $4\frac{1}{2}$  lb and works on a 90-psi air supply. It makes the ties with 16-gage wire supplied in the form of staples. The gun holds 75 ties per load and can be reloaded in about 3 sec.

Three models of the quick tie gun are available. Model 34 handles 3/8 and 1/2-in. rebars; Model 56 ties 5/8 and 3/4-in. bars; and Model 78 works on 7/8 and 1-in. reinforcing. The tool costs \$325. It has been field-tested for six months.—The Working Corp., 8635 Yolanda Ave., Northridge, Calif.

## Narrow-Frame Roller Can Work Near Obstructions

Only ¾ in. of the roller's frame extends beyond the rolls, permitting it to work close to obstructions. The General Engines Co. 4-6 ton tandem roller rides on a 36-in.-wide guide roll and a 45-in.-wide compression roll. Without ballast, the maximum pressure is 113 lb per lin in. of roll. When ballasted with 75 gal of water, the maximum compression increases to 172 lb per lin in.

Simple controls make the roller easy to operate. One lever controls forward and reverse—there is only one speed in each direction. The roller is equipped with automotive type hydraulic power steering, hydraulic brakes, and a roller chain drive. An 18-hp, 2-cyl Wisconsin engine powers the unit. Standard equipment includes a 12-v starter and generator, roll scrapers, and cocoa mats.—General Engines Co., Inc., U.S. Route 130, Thorofare, N.J.



#### Scraper Gets Big Power Plant

More horsepower and bigger capacity are the outstanding features of the LeTourneau-Westinghouse V-Power B Tournapull. Its General Motors V-12 diesel engine develops 430 hp. The scraper capacity is 23 yd struck and 29 yd heaped. A 35-ton rear-dump unit can be substituted for the scraper.

Another feature of the new scraper is a high-inertia steering motor that gives the operator two rates of steer. The slow rate controls the unit at high travel speeds, while the quick steering comes in handy for maneuvering in tight places. Two Donaldson dry-type air cleaners are standard equipment.

Price of the V-Power B with a 29-yd Fullpak scraper is \$58,736, fob Peoria.—LeTourneau-Westinghouse Co., 2301 NE Adams St., Peoria, Ill.



#### Loader Changes Direction Without Shifting Gears

One lever on the steering column of this loader controls both forward and reverse and eliminates gear shifting to change directions. The power-reversing transmission is standard equipment on the Allis-Chalmers TL-12 front-end loader. Four speed ranges in both forward and reverse give the loader maximum speeds of 21.2 mph and 27.9 mph respectively.

An automatic cut-off disengages the clutch when the brakes are applied. This, in effect, places the transmission in neutral and diverts full engine power to the hydraulic system. For long grades or dozing over banks, the clutch cut-off can be disconnected by flipping a lever.

Maximum dumping clearance of the TL-12 is 8 ft 4 in.; its lifting capacity is 9,500 lb. The loader develops a breakout force of 14,500 lb, and it can carry 4,000 lb. Four buckets are available with a capacity range from 1 to 2 cu yd.

Either gasoline or diesel power drives the unit.



An A-C gasoline engine develops 77 hp while a diesel unit is rated at 76.5 hp. Shipping weight of the diesel-powered loader is 11,550 lb. Attachments include a backhoe, lift fork, crane hook, and backfill blade.—Allis-Chalmers Mfg. Co., Milwaukee, Wis.



Construction of new skating rink at the University of Alberta calls for use of huge precast concrete girders. B Model Mack positions the heavy beam under the crane for unloading. Mack steering and braking systems give quick, sure handling under difficult conditions.



Multi-million dollar construction project involving runway extensions on the Namao Airport near Edmonton, Alberta, found Macks working 'round the clock to beat winter weather. Dependable, trouble-free performance is expected and received from Mack trucks no matter what the job.

# Mack performance pays off on everything from rinks to runways

On construction jobs of all kinds, experienced contractors are Mack boosters. Most trucks just can't provide the stamina and economy needed for month-in, month-out heavy-duty service under severe operating conditions.

Experienced operators continually prove that solving the problem of high costs calls for quality equipment. Mack quality begins with Mack-built major components—front and rear

axles, engines, frames, transmissions and brakes—which are made to the highest standards in the industry. It appears in special Mack features like the exclusive Balanced Bogie with Power Divider for positive traction over any terrain . . . and extends to Mack cabs, which offer the utmost in driver vision and comfort, easy access to all working parts, and minimum upkeep requirements.

You'll find that Mack quality con-

struction shows up in every phase of operation—and where it really counts, in net profit figures. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

7555-A

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FIRST NAME FOR
TRUCKS





#### Crawler Crane Is Easy to Maintain

Color-coded lubrication fittings simplify routine servicing of the Bucyrus-Erie 14-B crawler crane. In addition, all gears except the swing gear and pinion are enclosed and run in oil. Remote-control grease guns lubricate the swing gear and pinion. Other maintenance features include nylon pins and bushings in the control lever system, reversible clutch bands, and simple clutch and brake adjustments.

Capacity of the 14-B is 9 tons, and boom lengths range from 25 to 80 ft. Maximum length of a boom-jib combination is 85 ft. Working as a hoe or shovel, the rig handles a ½ or 5/8-yd bucket; this increases to 3/4 yd for clamshell or dragline work.

Tread widths for the crawler mounting range from 16 to 24 in. Four optional screw-jack outriggers increase the rig's stability and boost capacities about 15%. Standard power plant is a gasoline engine. It is available with a direct drive, a three-speed gear box, or a torque converter. Engines for high altitude work or diesel fuel are available also.—Bucyrus-Erie Co., South Milwaukee, Wis.

#### Hoe Snaps into Place in One Minute

Michigan tractor shovels can be equipped with a specially designed backhoe attachment that snaps into position in less than a minute without tools. The snap mount backhoe is available for Michigan 55A, 75A, and 85A tractor shovels.

Digging depth of the backhoe is 12 ft 4 in.; maximum reach from the center of rotation is  $15\frac{1}{2}$  ft. The boom swings through 180 deg. Breakaway force at the bucket teeth is 10,000 lb.

A variety of buckets can be snapped on or off the hoe in less than ½ min. Counterweights are included with the backhoe attachment for use on the tractor shovel when the hoe is disconnected.—Construction Machinery Div., Clark Equipment Co., Pipestone Rd., Benton Harbor, Mich.



#### Automatic Blade Control for Graders

New and used models of current LeTourneau-Westinghouse motor graders now can be equipped with the Preco Dial-A-Slope automatic blade control. This is an all-transistor installation that maintains the transverse slope of the grader blade to an accuracy of 1/10 of 1%.

Putting the Dial-A-Slope into operation requires three steps: (1) switching on the control; (2) setting the specified degree of slope on a dial; (3) turning a lever to select the end of the blade the operator wants to have under automatic control.

On the job, the operator needs to watch only one end of the blade and operate the lift lever controlling that end. The other end of the blade takes care of itself, maintaining the blade slope the operator has set on the dial.—LeTourneau-Westinghouse Co., 2301 NE Adams St., Peoria, Ill.



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## compare

DESIGN - POWER - STAMINA



BUY A... ELECTRIC DRILL

CERTIFIED STOUX POWER

## Electric Drills

When it's a SIOUX-you know what it will do!

The horsepower and torque for each Sioux electric drill is rated, stated, and certified. You are not expected to buy just a drill. When it's a Sioux you know what it will do. See complete power specifications for each Sioux Electric Drill in the Sioux catalog.

SuperPowered, 1/4" & 3/8" DRILLS!

Here is super torque for the toughest jobs. And a speed for every need. Entirely new design has placed the brushes at the fan position at the front of the drill.

Advantages include easier inspection and replacement without disassembly of the tool, and cooler running. Catalog No.'s 1472,73,74 — 14"; No.'s 1477,78,79—38".



SIOUX No. 1495 1/4" All Angle Drill

This exclusive SIOUX design is a favorite of men who work with tools. It's the most convenient, rugged, fistful of power. It operates in restricted space where other drills can't be used. All around usefulness on the widest range of jobs make this sturdy, dependable No. 1495 one of the world's best drill buys.





ELECTRIC SCREWDRIVERS

No. 260

On No. 260 Super Screwdriver, the operator controls the tightness with which a screw is set by the amount of pressure he applies.

The ¼" Hex Drive takes shanks for clutch head screwdriver bits, Reed and Prince, Standard screws, Phillips, and socket (Allen Type). On the No. 262 Super Screwdriver tightness is pre-determined by adjusting the clutch. Both models are equipped with reversing switch.



No. 242

It fits the hand, and operates in restricted space like no other electric screwdriver. It quickly drives or removes all types of screws. No. 242 has a positive clutch; the operator controls the tightness by the amount of pressure applied. No. 246 has an adjustable clutch, so that it can be preset for any uniform degree of tightness desired.





SIOUX

High Speed

STEEL HOLE SAWS

... cut holes from %" to 6" in diameter, in any free machining material to a depth of 1\%". Alloy or stainless steel may be cut at slow speed. High-Speed steel teeth welded to chrome-vanadium body give maximum life and cutting ability.

Look Under "TOOLS, ELECTRIC" in the Yellow Pages

ALBERTSON & CO., INC.

AIR IMPACT WRENCHES AIR SCREWDRIVERS
 ELECTRIC IMPACT WRENCHES ELECTRIC SCREWDRIVERS
 DRILLS GRINDERS SANDERS POLISHERS FLEXIBLE
 SHAFTS PORTABLE SAWS VALVE GRINDING
 MACHINES ABRASIVE DISCS.



#### Short Truck Mixers

Increased legal loads are possible with new, short Jaeger truck mixers. Short, large diameter drums help reduce the length of the mounting and transfer more weight to the front of the truck. For example, a 7-yd, short-base Jaeger mixer on a B426 FX Mack truck has a gww of 45,500 lb with 6 yd of 4,000-lb concrete and 100 gal of water. The short-base mounting makes it legal with 31,500 lb on the rear axles and 14,000 lb on the front.

Mixing drum capacities are 6, 6½, and 7 yd. Either flywheel or front-of-engine pto drive is available. A pressure water tank, either side or overhead mounted, is standard. The truck's compressor controls the water supply and eliminates a water pump.—The Jaeger Machine Co., 800 Dublin Avenue, Columbus 16, Ohio.



#### Truck-Mounted Backhoe

Any 2-ton truck can carry the Hy-Hoe 250 backhoe. The only modification to the truck is the addition of counterweights on the front end for better stability. The hoe can dig to a depth of 14 ft and dump at a height of 11 ft. Its reach is 20 ft, and the boom swings through 200 deg.

Struck capacity of the bucket is  $\frac{3}{6}$  yd, but the manufacturer claims that the unit easily handles  $\frac{1}{2}$ -yd heaped loads. Three separate hydraulic circuits give the rig a fast cycle time and boost production.—Hydraulic Machinery Co., Waukesha, Wis.



We call this new convertible the "MASTER BUILDER" because it is designed for the contractor who wants a moderate-priced instrument for secondary operations. Added brawn, without excess weight, combines with rotating center (as in engineers' levels) to assure accuracy for any construction challenge.

Its 3-ft. short focus enables you to work in cramped quarters. Its 22-power telescope will sharply define individual graduations on

a rod at greater distances. It gives you unrivaled performance even in poor light. Horizontal circle and vertical arc with double verniers read to 5 min.

Whether you're leveling a foundation, setting forms, laying concrete slabs or even building a road, you'll find the "MASTER BUILDER" a profitable time saver. Write for details.

C. L. BERGER & SONS, INC., 53 Williams St., Boston 19, Mass.



## BERGER

Engineering & Surveying Instruments...Since 1871



## SAVE ON SAWING with NEW TRUCO JOB-MATCHED SAWS and BLADES

The new Truco Counter-balanced, Self-propelled Concrete Saw and Truco Job-matched TruBond Diamond Blades are delivering almost unbelievable performance in cutting speed, blade footage and overall economy in the most difficult aggregates, with all types of reinforcements. On highways, parking lots, runways, floor slabs, etc., they are proving themselves as the finest concrete cutting combination and the thriftiest by far. See your Truco dealer for real money-saving facts. Write us for his name and free literature. TRUCO MASONRY DRILLING DIVISION, Wheel Trucing Tool Company, 32B-3200 W. Davison, Detroit 38, Michigan.



## MUSCLES under the mainline!

## Rodgers Hydraulic Jacks

#### push three 88 foot tiles under railroad without disrupting traffic

Two 200 Ton Rodgers Hydraulic Jacks were selected by W. J. Irwin & Sons, Inc., Tonawanda, N. Y. for driving three sewer pipes of 96" I. D. reinforced concrete tile 88' under the mainline of the New York Central Railroad. Part of a 2½ million dollar sewer contract on the Tonawanda West Side Drainage Project, the "push pipe" method was preferred because it permitted unrestricted use of the rail right-of-way overhead.

TIME: 34 DAYS—Actual jacking time consumed 34 days based on three-eight hour shifts a day. Each sewer took eleven 8-foot tile sections, The First Line required 14 days; the Second Line 11 days and the Third only 9 days.



JACKING PROCEDURE—A service pit 28' deep by 22' wide by 40' long was excavated to house the jacking equipment. A pair of 75 lb. steel rails placed on the concrete pit floor cradled the tile sections and acted as a guide for the jacking operation. Type of soil encountered in all three pipes was a mixture of heavy yellow and blue clay.

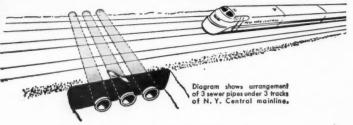
EQUIPMENT USED—Two 200 Ton Rodgers Hydraulic Jacks with 48" ram travel were powered by a Rodgers Model D2 electric driven hydraulic pump located at the top of the excavation pit. A valve panel located at the bottom of the pit permitted accurate control of the jacking operation.



Steel rails cradle tile sections as twin Rodgers Jacking Cylinders press against the wooden jacking frame. Heavy grease on outside of tile cuts down friction—for easier sliding.

Rear of excavation pit showing Hydraulic Jack against abutment:
wall. At this stage the ram is extended approximately 1/3 of the.
48" ram travel.

ADVANTAGES OF HYDRAULIC JACKING—This job was handled at low cost and was unique due to the short time required for completion and the fact that rail service overhead continued uninterrupted throughout the tunneling project below. Entirely different from conventionat tunneling, the "push pipe" method also provides greater safety to workers from cave-ins since they work inside the tile that is being driven.



If you'd like more details about this job, write for free copy of Bulletin 331.

## Rodgers Hydraulic Inc.

7403 Walker St. . Minneapolis 26, Minnesota





#### Cat Machines Get More Power, Speed, Capacity

Bigger engines on three Caterpillar motor graders have increased their productivity over that of previous models. A turbocharged, 4-cyl, 100-hp diesel powers the No. 112F grader, while an 85-hp engine drives the No. 112E. The No. 12E is rated at 115 hp. All engines are equipped with dry-type air cleaners.

Gasoline starting engines with 12-v electrical systems are standard. The lubrication system of the starting engine is interconnected with that of the diesel engine. This permits the starting engine to warm the oil of the diesel unit prior to starting it. The exhaust from the starting engine is circulated so as to warm the diesel intake air.

A new two-tooth jaw clutch on the No. 112E and No. 112F graders provides smoother control lever engagement, and a new control lock eliminates moldboard creeping.



Two track-type Traxcavators also feature several improvements. The 977 Series H is powered by a turbocharged, 150-hp diesel engine, and is equipped with a 2½-yd bucket in place of the previous 2¼-yd attachment. Bucket size of the 955 Series H has been increased from 1½ to 1¾ cu yd. The turbocharged, 4-cyl diesel engine on this unit is rated at 100 hp.

Maximum speeds are 4.6 mph in forward and 5.7 mph in reverse for the 977H, and 4.93 mph and 6.16 mph respectively for the 955H. Both units are available with gasoline starting engines as standard equipment or with op-





## 8 CONTRACTORS PRE-DEWATER WITH FLYGT on BIG SEWER JOB

On a \$23,180,000 sewer bond issue in Orange County, California, 3 separate contractors won their race against time and severe ground water intrusion with Flygt Electric, Submersible Pumps. The 19-mile Miller-Holder Trunk Sewer job experienced water intrusion from the first excavation, and it threatened to slow work to a crawl and run costs to astronomical highs. Key to the final success of the eight separate but simultaneous contracts was efficient, economical predewatering developed jointly by Gridley Equipment Co. and Stance engineers. Featuring more than 40 Flygt Electric, Submersible Pumps, the pre-dewatering systems drained and kept dry ditches along the right-of-way at substantial savings over other dewatering methods. Typical of contractor comments on the system:





"We are handling all of the water on our job with Flygt Pumps," stated C. B. "Jiggs" Pelland on Steve Rados' \$1,547,860 contract to place 4 miles of 69-inch line. "We turn them on when we shut down for the day and let them run all night without worry. They handle a lot of water and keep the placed pipe water-free."





"Our Flygt Pumps are in continuous operation keeping jacking pits and other excavations dry," remarks George Dakovich on his \$1,363,107 contract to install more than 4 miles of 45- and 51-inch pipe. "We have had dry working conditions from the first at low cost and with little attention."

Flygt Electric, Submersible Pumps range from 11/2" 85 gpm to 8" 3100 gpm capacity. Heads to 220"— higher in tandem. Designed and built for tough applications, they are adaptable to any dewatering job. Flygts run continuously with little attention, handle a high degree of solids, need no priming, are easy to handle and service. Ask today for literature and an on-the-job demonstration.



#### **EQUIPMENT NEWS...continued**

tional 24-v direct electric starters.

Three additional Caterpillar products are available as tractor attachments for improved push loading. The D9E tractor can be equipped with the No. 9C Cushion-Dozer; this incorporates four rubber springs that compress 2½ in. and absorb the shock of contact with a scraper.

For tandem pushing, the D9E and D9D can mount a cushion push block with four rubber springs that compress 6 in. before bottoming. Both the D8H and the D9E tractors can be equipped with tandem pusher C-frames that bolt directly to the track roller frame.—Caterpillar Tractor Co., Peoria, Ill.



#### **Towed Vibratory Roller**

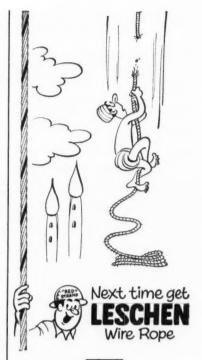
Vibration frequency of this roller can be controlled to match the natural frequency of a soil mass to obtain greater compaction efficiency. The Vibra-Meter is standard equipment on the Tampo VC80 vibratory compactor.

Rolling width is 60 in., and the gross weight is 7,000 lb. Maximum compaction effort is equivalent to 80 tons. A 36-hp, aircooled gasoline engine powers the unit.—Tampo Mfg. Co., P. O. Box 4248 Sta. A, San Antonio 7, Tex.



#### Small Excavator-Crane

Shovel capacity of the Unit 1220 excavator is ¾ yd. The rig is convertible to dragline, hoe, clamshell, or crane. Design features include disk-type clutches, gears and shafts running in oil, gasoline or diesel engines, a torque converter, and independent boom hoist. — Unit Crane & Shovel Corp., Milwaukee, Wis.



LESCHEN WIRE DON'T ROPE DIVISION

H. K. PORTER COMPANY, INC.



### CHIPPER CHARLIE

Never been sick a day in his life. But he knows it can happen to him—so he gets a health checkup every year—just in case. He also supports the American Cancer Society's Crusade. Send your contribution to "Cancer," in care of your local post office. AMERICAN CANCER SOCIETY





Steel wheels specified. Dual pneumatic tires standard.

LIMA AUSTIN-WESTERN

## Crushes old concrete to aggregate subbase

"We crush old concrete into 2½in. aggregate for a subbase on
asphalt and stone parking areas.
Our portable Lima Austin-Western 2036 primary jaw crusher
turns out a high daily tonnage
with an absolute minimum of
maintenance. We also have a Lima
A-W apron feeder on another
plant. The feeder has doubled
production.

"Based on our experience with the crusher, feeder, and an Austin-Western grader, I'd say that the

Baldwin-Lima-Hamilton Corporation turns out quality products which hold up longer and do better jobs than most competitive equipment."—George H. Souter, Gargaro & Souter, Inc., Detroit.

Lima Austin-Western offers a complete line of top quality crushing, screening and washing equipment. The finest materials, skilled workmanship, simplicity of design, and engineering experience are reflected in performance records, Depend on Lima Austin-

Westerns for accurately sized gravel in quantity and years of trouble-free service. Choice of compact, self-contained portable units or custom-engineered stationary installations. Both types assure you high-speed operation and lower tonnage costs. Ask a Lima A-W owner. See your nearest Lima Austin-Western distributor for facts and figures. Or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

#### LIMA AUSTIN-WESTERN Crushing, Screening and Washing Equipment

BALDWIN . LIMA . HAMILTON

CONSTRUCTION EQUIPMENT DIVISION . LIMA, OHIO





Hydraulically controlled Model 210 A-W crane inches 18-in. cast-iron water main into position in San Diego County, Calif.

## How A-W crane speeds pipelaying

"The more we use our 3-year-old Austin-Western hydraulic crane, the more uses we find for it," states B. K. Stoneman Sons, Inglewood, Calif., mechanical contractor.

"For instance," they add, "it is excellent for pipelaying. Hydraulic controls permit placement of heavy pipe with speed and precision. The telescoping boom lets the operator work pipe forward for a perfect joint without even moving the machine. All-wheel drive and steer mean exceptional maneuverability and traction on any surface. The A-W

is a real time and money-saver!"

Austin-Western now offers a complete line of lift, carry and place equipment. 5 models—capacity ranges up to 11 tons. Wide choice of optional equipment for added versatility. Available selfpropelled, truck or stationary mounted. No other crane offers you all of the profitable advantages and quality construction features of an Austin-Western. Let us prove this to your satisfaction. Write for all the facts or ask your nearest A-W distributor.

### Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes



#### Self-Erecting Materials Tower

Trailer-mounted Buck HoisTowers are self-erecting to 45 ft, but they can be extended with additional 5 or 10-ft-long tower sections. The lifting capacity is 1,500 lb, and the hoisting speed is 100

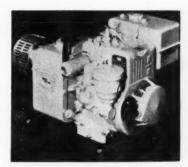
Four floor stops can be set on the floor selector mechanism. The stops are simply positioned at the proper point on the cable, and cutouts on the selector mechanism stop the platform and lock it into position during loading or unloading.

Either 9 or 12-hp gasoline engines or electric motors are available for the GA-15-H HoisTower. Electric starting and all safety devices and controls for a 45-ft tower height are standard equipment.-Buck Equipment Corp., 720-X Anderson Ferry Rd., Cincinnati 38, Ohio.

#### Conveyor Belt For Work on Slopes

Diagonal ridges on top of a Hewitt-Robins conveyor belt enable it to carry bulk materials up slopes without slip-back. The Cleat Top Belt can work on a 21deg slope. The diagonal ridges can be pointed in the direction of belt travel to retain moisture in the load; reversing the belt will drain water off the material on the belt.

Available belt widths range from 12 to 30 in.; wider sizes will be available in the future.-Hewitt-Robins Inc., Stamford, Conn.



#### Self-Priming Centrifugal Pumps

Two portable, self-priming, centrifugal pumps are the first such units ever built by Pacific Mercury. The 5M pump is a  $1\frac{1}{2}$ -in. model powered by a 3-hp engine; it can pump 5,000 gph. The larger 7M has a 2-in. suction and discharge and handles 7,000 gph.

Extensive use of aluminum keeps the weight to a minimum—the 5M weighs only 42 lb. Standard equipment on the pumps includes a recoil starter, oil bath air cleaner, suction strainer, shock absorbing rubber mounts, carrying handle, and replaceable wear plate and iron volute. — Pacific Mercury, 13232 Leadwell, North Hollywood, Calif.



#### Vibrating Screed Adjusts to Any Width

Each end of the Maginniss vibrating screed can be adjusted over a width of 4 ft giving the unit a total 8-ft width adjustment. The screed assembly consists of a vibrating unit and a pair of end dollies that are mounted on 2x10 or 3x10-in. wood beams up to 36 ft long. The dollies are equipped with handles that raise the beam when backing up for a second pass.

Two V belts, powered by a 2½-hp four-cycle, air-cooled engine, drive the eccentric. Vibration frequency on engine driven units is variable from 3,600 to 8,000 vpm. A centrifugal clutch permits the engine to idle without vibrating the beam. An electric drive without the clutch but with an on-off switch in place of the engine throttle, is optional.—Maginniss Power Tool Co., 154 Distl Ave., Mansfield, Ohio.



Pennsylvania contractor chooses -

## ALL-WHEEL DRIVE AND STEERING!

"We chose an Austin-Western Super 100 grader because we're a growing construction firm and need a single all-purpose grader that will handle an entire highway job from rough to finish grading."

#### All-wheel steering

"We've found it to be powerful, fastworking and dependable. All-wheel steering's slick. It lets you work the A-W in and out of tight spots where other make graders can't even go.

"Our operator is sold on it too. He likes the extra power he gets from its all-wheel drive. He says it's easy to maneuver and hydraulic controls make it easy to operate.

"We also bought an Austin-Western Roller-Compactor at the same time we bought the grader. Both have been dependable, trouble-free machines."—S. P. Mehring, Mehring Construction, Hanover, Pa.

#### Super, Pacer models

All-wheel drive and all-wheel steering are exclusive with Austin-Western grader

line. These two features help make A-W the one grader that will perform every grading job with equal ease and precision; rough or finish. Ask an A-W owner or operator; learn what he has to say.

A-W graders are available in 6-wheel Super and 4-wheel Pacer models. Weight classes from 16,000 to 30,000 lb.; horsepower ratings from 106 to 143 hp. Get all the facts; ask for a demonstration. Just contact your nearest A-W distributor.



 P. Mehring's A-W Roller Compactor lays fines on highway construction project. Vibratory attachment available for most makes of 3-wheel rollers.

### Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders . Motor sweepers . Road rollers . Hydraulic cranes

#### All-Purpose Excavator Handles Variety of Jobs

This versatile, full-revolving digger can work as a shovel, backhoe, or front-end loader; when necessary it can double as a crane. The Yumbo is a new all-purpose excavator that can be either crawler or wheel-mounted and can lift 6,600 lb or dig to a depth of 131/2 ft. Bucket capacities are 3/8 yd for the backhoe, 5/8 yd for the shovel, and % yd for the loader. For lifting or materials handling the crane hook reaches 21 ft.

Continental engines, either gasoline or diesel, power the Yumbo. The gasoline engine is rated at 73 hp, while the diesel unit develops 66 hp.

No transmission, brakes, or clutches are necessary for the allhydraulic crawler-mounted model. High torque hydraulic motors supply power directly to each track and act as brakes when the oil supply is reduced or stopped. Tracks can be controlled simul-



taneously or independently and can move in opposite directions for better maneuverability. On the wheel-mounted models the final drive is a two-speed transmission with a differential.

Maximum speed for the crawler-mounted models is 11/4 mph in either forward or reverse. The wheel-mounted Yumbos can move at 61/2 mph.-Hydraulic Eqpt. & Shovel Co., Pearland, Tex.

## YOU CAN DO IT FASTER..

### with Bailey Bridging ...



For emergency, access, permanent or suspension type bridging. These versatile units also used for buildings, forms, trestles, falsework. Briege shown here is over Smooth Rock Falls, Ontario, Canada, one of five Baileys used by Ontario Department of Highways in this area.

#### and Uniflote Ferries .

Combined floating Uniflote sections provide combined rearring difficience sections provide triansport across where for loads up to 100 tons? Other uses: floating platforms for derricks, cranes, piledrivers, Landing stages, wharves, piers, etc. Unifilate Ferry in photograph carried 30-ton equipment load across Harbour in Toronto, Canada.



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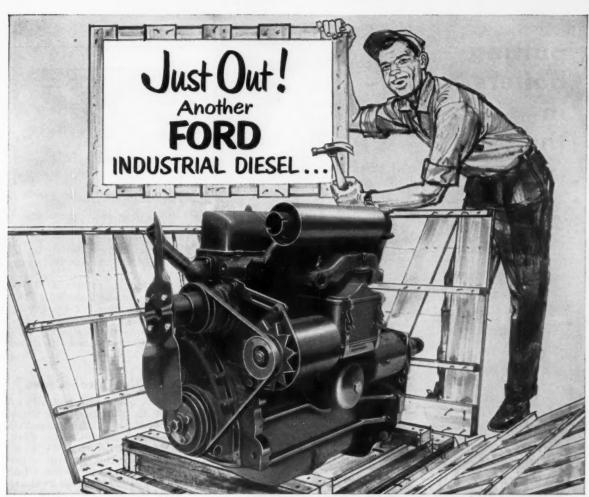
38 COMMERCIAL ROAD

Timberland Machines Inc. Park Street, neaster, New Hampshire

REPRESENTATIVES Mason and Bacon in McClure Building Frankfort, Kentucky

TORONTO 17, CANADA

Bailey Bridge Equipment Co. o, Conejo Avenue in Luis Obispo, California



## FORD PRESENTS THE 172 THEIR DIESEL FOUR !

(and it's interchangeable with the 172-cu. in. gasoline engine)

To meet the growing demand for diesel power, Ford now offers a choice of three economical diesels—the highly efficient 172-, 220- and 330-cubic inch models.

Whichever you select, you'll be getting a completely modern diesel that delivers the high torque necessary to handle tough jobs with outstanding operating economy and easy, low-cost maintenance.

Ford Diesels also offer dependable 12-volt electrical systems for quick starting . . . replaceable cylinder sleeves that eliminate costly reboring . . . and rotating exhaust valves for better seating, longer valve life.

What's more, Ford's 172 Diesel and 172 Gasoline engines are *interchangeable* in your equipment. Many parts, too, are interchangeable between these engines. And low-cost Ford parts and service are always available at any nearby Ford Power or Tractor Dealer.

For greater productivity and more profit in the long run, it will pay you to check the 172 model or other Ford Diesels at your Ford Industrial Products Headquarters.





ENGINE SERIES Basic Model		172 FOUR DIESEL	220 FOUR DIESEL	330 SIX DIESEL Y
Bore and Stroke—Inches		3.9 x 3.6	3.94 x 4.52	3.94 x 4.52
Displacement—Cubic Inches		172	220	330
Brake Hersepower	Dynamometer	59 @ 2400	60 @ 2250	96 @ 2250
	80% Dyn. BHP	47 @ 2400	48 @ 2250	77 @ 2250
Torque	Dynamometer	140#@ 1200	151#@ 1600	236# @ 1600
	80% Dyn. BHP	112#@ 1200	121#@ 1600	189# @ 1600
Compression Ratio		16.5 to 1	16 to 1	16 to 1 *

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to: FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.



#### Portable Crusher

Traveling weight of the Diamond model 70 crusher is about 55,000 lb. Its crushing capacity is 175 cu yd per hr for material passing a 1-in. screen, based on 25% oversize.

Components include a 10x36in. jaw crusher, 32x24-in. star gear roll crusher, 2½-deck 4x12ft vibrating screen, and 30-in.wide conveyors.—Diamond Iron Works, Halsted St. and 48th Place, Chicago 9, Ill.

#### **Domestic Tower Crane**

Push button remote controls operate the electrically powered Shlagromatic tower crane. The 100-ft-high crane can lift 2,000 lb. Maximum reach is 65 ft.

The crane rides on rails at the job site. The tower rotates a full 360 deg.—Shlagro Steel Products Corp., Somerville 43, Mass.



#### Rippers for Euclids

Two types of tool beams are available on ATECO rippers designed for the Euclid C6 tractor. The HR-C6 is equipped with a standard straight tool beam; the HR48-C6 has a pipe-line tool beam: It places the center shank 20 in. back of the straight beam position giving the unit a 48-in. lift to accommodate long shanks for pipe line or cable laying operations.

Both models handle one, two, or three shanks, either straight or curved. Digging depths are 25, 42, and 48 in. The shanks are swivel - mounted. — American Tractor Equipment Corp., 9131 San Leandro, Oakland, Calif.



Three boilers—28 tons each—are being safely lowered from flat bed trailers to the cellar floor—35 ft. down—at the new I.B.M. Research Center, Yorktown, N. Y. And that was only half the job. The crane had already transferred the boilers to trailers from railway flat cars. And it required from 90 to 110-degrees of swing to handle these boilers. That's real maneuvering for a 20-ton crane. This Waukesha-Engine-powered Bucyrus-Erie 30-B Crane did it neatly. Gerosa Crane Service, Bronx, N.Y. are the owners.



Waukesha Gasoline, six cylinders, 4%-in. x 5½-in., 554 cu. in. displ.

Waukeshas are standard for crane operation. Model 140 Series gasoline engines available up to 225 hp. Other models for cranes or shovels, up to 1200 hp., Diesel or gasoline. Send for descriptive bulletins.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
NEW YORK TULSA LOS ANGELES

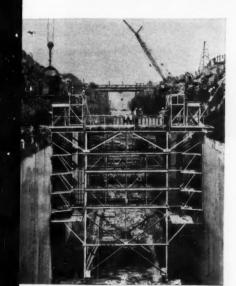
Factories — Waukesha, Wisconsin, and Clinton, Iowa

476



Arch-placed concrete has a 23-ft. radius, varies in thickness from 4½-ft. at crown to 6-ft. at abutments. Abutment-positioned hinges have a 15-in. radius. Crown hinge radius is 12-in. Compressible filler near hinges allows rotation and opening and closing of outside concrete faces.

## Blaw-Knox Steel Forms shape five miles of twin conduits at Niagara Power Development



Three contractors are building twin conduits 22,600 feet long, 46 feet wide and 66 feet high. All three use especially designed Blaw-Knox Steel Forms to place a total of 1½ million cubic yards of concrete.

The flexible conduit will permit arch loads to carry into rock through abutments. Steel rods anchor slab and wall concrete to guard against hydraulic pressure during conduit dewatering and possible rock movement.

Saves 35% assembly time. Forms are assembled faster and at reduced labor cost, according to Balf-Savin and Winkelman, one of the contractors on the \$100 million conduit project. Another, Gull-DeFelice notes that only 15% of its men are needed to erect, move, set-up, and maintain Blaw-Knox Forms. And Merritt-Chapman & Scott "can always count on Blaw-Knox for quality equipment and dependable professional service."

More and more contractors turn to Blaw-Knox Steel Forms Consulting Service for skilled assistance in building dams, tunnels, bridges, and other projects. Backed by 40 years of forms building, Blaw-Knox has complete facilities to fabricate forms to your needs, and to deliver them on time. For details, write Blaw-Knox Equipment Division, Pittsburgh 38, Pa., or call STerling 1-2700.

BLAW-KNOX

Steel Forms

## You Name the Job ....

No matter what it is, you have the answer with the new Homelite "300" Pumps. Three models are available . . . the quiet, slow speed model for economical, high capacity pumping jobs... the standard-speed, fast-priming model for jobs requiring higher discharge pressures . . . the high-volume pressure model for jetting, fire-fighting, irrigation and other jobs requiring high discharge pres-

sures. Each model weighs only 103 pounds. Each pumps 300 gallons per minute . . . 18,000 G.P.H. Fast self-priming, up to 28 ft. above water level. And as an extra bonus, each of the new "300's" has a new ceramic-coated seal that greatly reduces maintenance costs.

See it in action. You'll want to put it in action fast.

USED BY MEN WHO BUY EQUIPMENT FOR WHAT IT SAVES



#### Now Available!

## NEW AUTOMATIC IDLE CONTROL

New Homelite idle control accessory automatically idles engine when water level drops below strainer . . brings engine up to full pumping speed as water level rises. Because pump works only when needed, you save fuel, maintenance and labor costs. Ask for a demonstration.

Homelite factory branches are located throughout the country. Your nearest one is as close as your phone. Call them or write for convincing demonstration or rapid service in any way.

## HOMELITE

PUMPS GENERATORS . BLOWERS

HOMELITE . A DIVISION OF TEXTRON INC., 1006 RIVERDALE AVE., PORT CHESTER, N. Y.



#### Belt Loader For Cat Grader

Higher belt speed on the Ulrich Domor 64 loader enables it to load as much as 900 yd per hr. The belt is 48 in. wide, and the cutting disk is 36 in. in dia. Conveyor lengths range up to 31 ft. The unit is designed to match the capacity of the Caterpillar No. 14 motor grader.

A pivoted connection between the lower end of the conveyor and the disk beam keeps the disk at a predetermined distance from the belt and prevents the disk from accidentally cutting the belt. —Ulrich Mfg. Co., Roanoke, Ill.



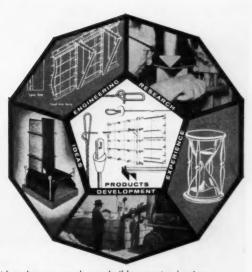
#### Self-Propelled Chip Spreader

Synchronized material flow and ground speed simplify the operation of the HI-WAY "S" self-propelled chip spreader. An adjustable feedgate on the rear hopper maintains the required amount of material in the front or distributing hopper. A 36-in.-wide conveyor belt delivers the material from the rear to the front hopper.

Struck capacity of rear hopper is 3.5 cu yd—enough to cover an intersection without recharging. The front hopper is about 13 ft wide and is equipped with a symmetrical feed roll and an agitator that insures an even coat.

The unit's power plant is an 88-hp gasoline engine coupled to a torque converter and a five-speed transmission. Maximum travel speed is 20 mph in forward or 10 mph in reverse.—Highway Equipment Co., Dept. H15-9, 616 "D" Ave. N.W., Cedar Rapids, Iowa.

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It's no accident that more and more builders are turning to
Gates Forming Systems for results that can be counted at the bank.
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### **CUTTING POWER!**

## Doors Through 18-inch Walls



How do you cut doors and windows through 18-inch reinforced concrete walls without ruinous delays? A general contractor got the job done and out of the way with Longyear diamond drilling equipment. Workmen cut around the openings with 6-inch diamond bits, and carefully lifted out the giant

slabs of concrete. The whole job was done in a few days at low cost and the entire project was kept on schedule. Your Longyear dealer can show you other diamond drilling applications that are cutting construction costs, and tell you about the new industrial diamond drills.



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## Cleveland J-40 digs shale and rock 3-5 feet deep for highway drainage

**THE JOB:** 20 miles of drainage trenching in both inner and outer shoulders of five miles of dual highway for the relocation of U.S. Route 25 near Middletown, Ohio.

**CONDITIONS:** trench to be cut to grade, 18 inches wide, 3 or 5 feet deep depending on inner or outer shoulder, through very densely compacted shale and rocky material, further densified because much of the grade carried hauling equipment all through a winter, spring and summer.

**PERFORMANCE:** despite need to replace worn bucket teeth more frequently than usual because of the tough digging, the Cleveland J-40 dug the trench to accurate grade at the rate of 1,800 to 2,000 feet per 9 hour day.

#### J-40 FEATURES:

- Stability—on wide-spaced crawlers, 1000-hour-lubricated
- 100% control of every operation at the operator's seat
- V conveyor for faster, higher, more efficient spoil discharge
- Pulley-enclosed dual, independent, conveyor drive
- Automatic conveyor shifting from side to side
- Over 30 non-slipping digging speeds
- Digs trench 17½ to 30 inches wide, down to 5½ feet deep.

#### The CLEVELAND TRENCHER co.

20100 ST. CLAIR AVE. . CLEVELAND 17, OHIO



## Everywhere



#### Powered Curb Builders

More speed is one of the features of the current models of Stephens-Canfield curb building machines. The units can work as fast as 12 fpm. Other improvements include a removable hopper for easier maintenance and a new type compaction screw.

The curbing machines can lay either concrete or asphalt curb. For concrete curbs the mix has to be relatively dry with zero slump; for asphalt curbs the mix has to be dense.—Power Curbers, Inc., P.O. Box 1465, Salisbury, N. C.



#### Gasoline Engines Get More Horsepower

Horsepower ratings of three International 6-cyl, carbureted engines have been increased without changing the displacement. The new units are the 165-hp UR-372, the 182-hp UR-450, and the 212-hp UR-501.

Downdraft carburetion and a velocity governor are standard on the ne wengines; the current models have updraft carburetion. Both the three new units and the three current ones are available with natural gas or LPG attachments.—International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

#### In Heavy Construction Equipment, too,

### the Trend is to LIPE CLUTCHES



Cost-conscious construction men count profits in terms of actual operating costs. Replacement clutches are measured not only by initial price, but also by the frequency and cost of repair and maintenance. All these factors add up to the growing trend among heavy equipment contractors to specify LIPE replacement clutches in dumps, cranes, shovels, earthmovers and other heavy duty rolling stock.

Simplicity, direct drive, easy adjustment

and replacement-exchange make the Lipe DPB the choice of construction men for truck GVW applications of 19,000 pounds and up. Built with fade-resisting chromesilicon springs, and designed to shrug off shocks and dissipate friction-generated heat, the DPB stays in service longer, with lower costs for fuel, oil, brake relining and repair of all components in the power train. See your Lipe distributor soon. He'll show you why...the trend is to LIPE!



Lipe Heavy-Duty DPB Clutches are available in single and two-plate types; 12", 13", 14" and 15" sizes; with torque capacities from 300 to 1900 ft.-lbs.





## TURBOVIBER®

Powerful, dependable, high speed, form vibrator for concrete casting yards

10,000 rpm. Exerts over a ton of force.

No motor lubrication. No sliding friction. Minimum maintenance.

Only one rotating assembly. Long life.

Always starts. No vanes to stick.

Drastically reduced operating costs.

Convenient mounting clamps for easy attachment to any form.

For additional information, see your Viber dealer or write Viber Company, 726 South Flower Street, Burbank 11, California.





#### Improved Wheel Dozer

More stability, easier steering, a new blade, and better blade control are the main features of the improved Michigan 180 tractor dozer. The wheelbase has been increased 12 in. for better stability. Overall length with the blade in the operating position is 19½ ft. Steering is easier because two double-acting hydraulic cylinders control this system; previously there was only one cylinder.

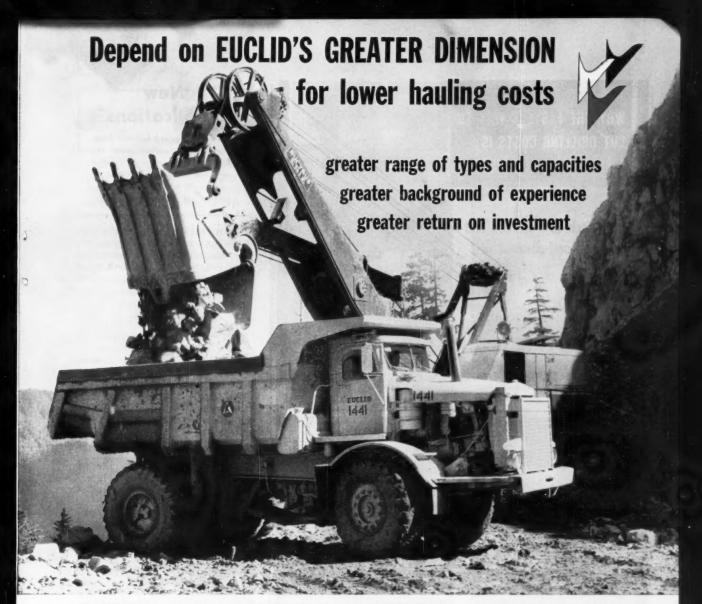
The new dozer blade is 10 ft 3 in. wide—an increase of 3 in. Also, it contains a built-in push plate that permits the 180 to work either as a dozer or a pusher without changing blades. Two doubleacting hydraulic cylinders have been added to the blade push arms and are controlled with a single lever. — Construction Machinery Div., Clark Equipment Co., Pipestone Rd., Benton Harbor, Mich.



#### General Service Pump

Suction and discharge openings on the Marlow 2AA1-B pump are 2-in.-dia male-threaded connections. The pump has a three-position discharge and a type "R" strainer for ordinary dewatering. For vacuum cleaning operations it can be equipped with Marlow's 10 X strainer with a stainless steel basket.

A two-wheel frame mounting is standard. The pump is powered by a Briggs & Stratton engine and delivers 7,800 gph.—Marlow Pumps, Div. of Bell & Gossett Co., Midland Park, N. J.



Model R-27 has rated payload of 54,000 lbs. and a heaped capacity of  $26\frac{1}{2}$  yds.... available with Cummins 335 h.p. and GM 336 h.p. engine . . . 4-speed Torqmatic Drive with converter lock-up and Torqmatic Brake . . . dual hydraulic booster steering . . . 18.00 x 25 tires on all wheels . . . rugged body with twin hoists . . . top speed with full payload, 34 mph.

Backed by better than 25 years of specialized experience in building off-highway earthmoving equipment exclusively, Euclid's modern rear-dump line incorporates advanced engineering that is a result of unmatched field experience. From the 10-ton Model R-10 to the big 55-ton "Euc" with two engines and a total of 672 h.p., Euclid Rear-Dumps meet today's requirements for big performance.

This greater dimension . . . in a wide range of capacities, in choice of engines, transmissions, tire sizes, and in type of hauler . . . in the parts and service facilities of Euclid's world-wide dealer organization, too . . . can mean lower hauling costs on all kinds of earthmoving jobs.

EUCLID Division of General Motors, Cleveland 17, Ohio
Euclid (Great Britain) Ltd., Lanarkshire, Scotland

A complete line of rear-dumps with payload capacities of 10, 15, 18, 22, 27, 40 and 55 tons . . . also semi-trailer models of 12, 22, 35 and 50-ton capacity.



## EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



## New Publications

These catalogs and bulletins from manufacturers contain useful information about construction equipment and materials. To obtain a copy, write directly to the manufacturer at the address given.

CRAWLER CRANE—A 12-p bulletin covers the Thew-Lorain 47-ton Model 820 A crawler crane that can be equipped as a 2-yd shovel or as a dragline, clamshell, or backhoe. The bulletin (36753-0) gives details of turntable design and construction, air controls, and new 10-year warranty for a "Shear-Ball" connection on which the turntable revolves.—The Thew Shovel Co., Lorain, Ohio.

WELDING-The third section of the revised edition of the Welding Handbook has been published by the American Welding Society. It covers special welding and metal joining processes, as well as arc and oxygen cutting processes. The volume contains more than 512 pages, 385 illustrations, and 78 tables. Included are chapters on forge welding, thermit welding, induction welding, surfacing, metallizing, brazing, soldering, welding of plastics, adhesive bonding of metals, oxygen cutting, arc cutting, ultrasonic welding, welding by cold working, and stud welding. A free descriptive leaflet is available. Price of the volume is \$9.-American Welding Society, 33 West 39 St., New York 18, N.Y.

FINISHER-FLOAT — The new Rex combination finisher-float for concrete surface finishing is described in Bulletin 60153. It presents details and illustrations of the machine's frame adjustability, hydraulic controls, 16-in. rear metering screed, 30-in.-wide pan float for final finish, and crownchange controls.—Chain Belt Co., Milwaukee 1, Wis.

TRACTORS—New developments in the D4 Series C and D6 Series B crawler tractors are described in separate 12-p booklets. Bulletin 33550 describes the D4, which has a diesel engine that develops 65 flywheel-hp and 52 drawbar-hp. The D6, detailed in Bulletin 33611, has a diesel engine rated at 93 flywheel-hp and 75 drawbar-

## Birth Of A Blast

Many unique tools are used by Spencer Chemical Company in blasting research. For example, these exclusive photos, taken at intervals of seven millionths of a second by a special camera, record the detonation of a 4-lb. mixture of Spencer N-IV Ammonium Nitrate and fuel oil.

Research like this, conducted by Spencer's own staff, and sponsored by Spencer at leading U. S. research centers, results in new and better ways to use Spencer N-IV and fuel oil for blasting.

Spencer Chemical Company would like to share this knowledge with you. For information, use the coupon below.



2:13 P.M. The 13"-long charge, containing 94% Spencer N-IV Ammonium Nitrate and 6% fuel oil is about to be detonated.



2:13.000028 P.M. The detonation wave has already spread over nearly one-third of the Spencer N-IV—fuel oil mixture.



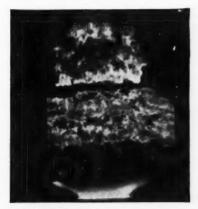
2:13.000056 P.M. This mighty, but controllable, energy is partly a result of N-IV's special structure and greater nitrogen content.



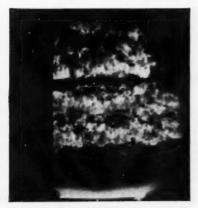
2:13.000088 P.M. Shown here is the great detonation velocity of the N-IV—fuel oil mixture. Yet, N-IV is safe to store and handle.



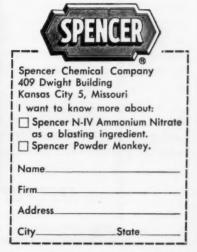
2:13.000128 P.M. The continuous and even release of energy shown here is a result of extensive Spencer research.



2:13.000160 P.M. Near maximum energy is now being released by the low-cost Spencer N-IV Ammonium Nitrate—fuel oil mixture.

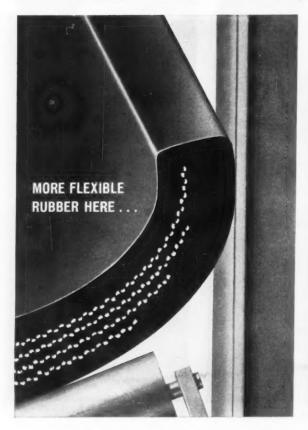


2:13.000184 P.M. Full detonation! For information on how you can use Spencer N-IV Ammonium Nitrate, fill out, mail coupon at right.



## Thermoid "COLEDGE" BELTING

## REDUCES EDGE WEAR, ADDS MILES OF USE!





Improper training can ruin a conveyor belt faster than any other abuse. Riding up and rubbing against a frame member soon wears away the stiff edge of conventional belting and exposes the carcass plys to moisture, mildew, dirt and eventual ply separation. "Coledge" belt construction was developed by Thermoid Division-to overcome this weakness and extend belt life.

"Coledge" construction puts plenty of extra rubber on the edges where it counts most . . . the plys are stepped back to make a more flexible edge that rides with the punches when misalignment occurs. This

"Coledge" construction can put many extra miles on your system, especially in coal fields and sand and gravel pits where most belt failures are the result of excessive edge wear. Exclusive with Thermoid Division, "Coledge" construction is available in any standard type belt your application may require.

So, if you have an edge-wear problem with conveyor belts, specify "Coledge" construction. See your Thermoid Division industrial distributor for technical data or assistance, or write Thermoid Division, H. K. Porter Company, Inc., 200 Whitehead Road, Trenton 6, New Jersey.

THERMOID DIVISION



H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

### NEW PUBLICATIONS . . .

hp. An 8-p bulletin (D004), entitled The Profit Side of your Ledger, features the D7 Series D tractor and the D4 and D6. The D7 has a diesel engine that develops 140 flywheel-hp and 112 drawbar-hp.—Caterpillar Tractor Co., Peoria, Ill.

MARINE PRODUCTS - Marine construction products and components for harbors, locks, docks, dams, and marinas are featured in Bulletin 300-P11. The 8-p booklet covers single and double channel wales for sheet piling, tie rods and anchor bolts, navigation pier warning towers, steel and aluminum hand railings, catwalks, structural piling supports and mooring posts, wedge-type steel anchor brackets, and fabricated structural steel and steel plate for a variety of uses.-Commercial Shearing & Stamping Co., Youngstown 1, Ohio.

CRANE BUCKETS-A 32-p catalog illustrates all types and sizes of Williams clamshell and dragline buckets and stone grabs. It includes information on the principles of bucket operation and selection, plus complete specifications for heavy-duty multiplerope excavating buckets from 1/2 to 3 vd, multiple-rope materials handling buckets from 1/2 to 41/2 yd, heavy duty power-arm dredging buckets from 1/2 to 6 yd, power-arm excavating buckets from 3/8 to 31/2 yd, power-arm materials handling buckets from 1/2 to 5 yd, and dragline buckets from 3/8 to 5 yd.—The Wellman Engineering Co., 113 St. Clair Ave. N.E., Cleveland 14, Ohio.

TANDEM ROLLERS-Four Galion Roll-O-Matic tandem rollers are described in an 8-p catalog (No. 425.) The 5-8-ton and 8-101/2-ton rollers are driven by a 6-cyl gasoline or diesel engine that develops 70 hp. Both have a 134-in. wheel base and an 18-ft turning radius. The 8-12-ton and 10-14-ton rollers are equipped with either a 6-cyl gasoline or diesel engine that develops 90 hp. They have a 1421/2-in. wheel base and a 19-ft turning radius.-Galion Iron Works & Mfg. Co., Galion, Ohio.

**PORTABLE POWER TOOLS—**A 12-p brochure presents complete

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#### NEW PUBLICATIONS . . .

continued

data, specifications, and over 70 illustrations of Syntron's portable power tools. The brochure describes self-contained electromagnetic hammers and drills, gasoline hammer paving breakers and rock drills, pulsating magnetform vibrators, and vibrating concrete floats.-Syntron Co., 500 Lexington Ave., Homer City, Pa.

DIAMOND BITS-Acker's complete line of diamond bits, core barrels, rotary rock bits, and drag-type bits are covered in a 28-p bulletin (No. 10). Sectional cut-away drawings illustrate internal details and operation of core barrels. Recommended applications for the bits and core barrels are described. - Acker Drill Co., Inc., P.O. Box 830, Scranton 2, Pa.

"SPRAWLER" CRANE - Koehring describes its 330 "Sprawler" crane in a 6-p brochure. The crane has a 30-ton lifting capacity, 21/2 tons more than its own weight, and it handles a boom and jib up to 150 ft long. The crane features pivoting outriggers that swing out from the crawlers to give it extra lifting capacity. In addition to construction and design details, the brochure shows how the crane can be stripped to two-thirds its own weight for transportation. - Koehing Co., 3026 West Concordia Ave., Milwaukee 16, Wis.

CONCRETE VIBRATOR-A 2-p bulletin (J-189) describes the Dart Model DHC-100 concrete vibrator for use with 180-cycle generator of either 115 or 230-v. The vibrator has the motor in the head. The head is 21/2 in. in dia, 21 in. long, and weighs 19 lb .-Dart Mfg. & Sales Co., 1002 So. Jason St., Denver, Colo.

SCRAPER-Operating details of the Model D Tournapull scraper are presented in a 16-p brochure. The utility-size scraper has a 9cu-yd heaped capacity, and its prime mover is powered by a 143hp General Motors diesel engine. The brochure also illustrates attachments for the prime mover, including an 11-ton rear dump, a 10-ton flat bed, a 10-ton side dump, and a 10-ton crane.-LeTourneau-Westinghouse Peoria, Ill.

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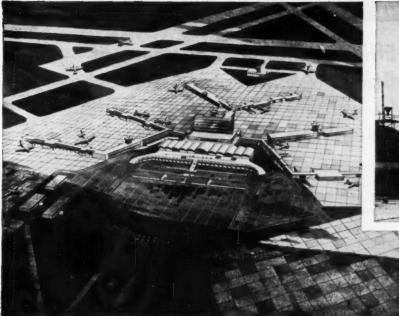
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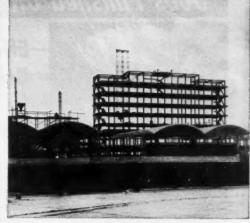
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Illinois Toll Highway Bridge



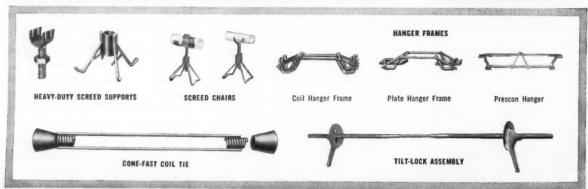
Vallejo, Calif. Interchange



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## Maintenance Shop



A BETTER BLADE—Welder hardsurfaces the cutting edge on a bulldozer blade with the electric arc process and a coated elec-

trode. The hardsurfacing material is applied to the leading surface of the blade and controls the wear pattern, keeping the edge sharp.

## Cutting-Edge Hardsurfacing Makes Self-Sharpening Blades

By J. E. HINKEL
Application Engineer
The Lincoln Electric Co.

CONTRACTORS tend to think of hardsurfacing strictly as a maintenance procedure and too seldom use it to improve equipment productivity. But a good hardsurfacing program can substantially increase equipment service life. It can also directly lower operating costs and increase efficiency through improving equipment performance.

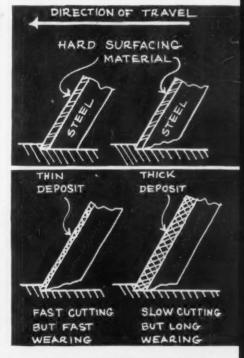
Development of a self-sharp-ening edge on earthmoving equipment to gain higher operating speeds offers a good example of such an application of hardsurfacing. Service conditions must be analyzed before the proper surfacing material can be selected, just as in the case of maintenance hardsurfacing. Choice of material, and the use of correct procedures to apply the right amount in the best place are essential to obtaining performance improvement.

To produce a self-sharpening cutting edge, a controlled wear condition must be created. This is contrary to most hardsurfacing applications where wear prevention is being sought.

Various deposit arrangements will control edge shape and wear. A layer of wear-resistant material on the advancing edge only allows the base material to wear away faster, keeping a fresh sharp edge exposed for better cutting. Edge life is directly proportional to the thickness of the deposit. A heavy deposit increases edge life but reduces production speed. A fast cutting edge should have a thin hardsurfacing layer that is sharper and cuts deeper but wears faster.

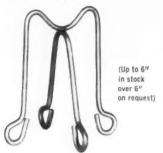
Production increase, part life, and cost of surface rebuilding should be compared to serve as a

SELF-SHARPENING BLADES — Hardsurfacing material wears slower than blade steel and maintains a good cutting edge. Thickness of the deposit controls the wear.



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#### MAINTENANCE SHOP . . . continued



**BEFORE AND AFTER**—The position of hardsurfacing material on a part controls its wear pattern. The cutting edge of the hardsurfaced tooth (left) were slowly, outlasting the face of the tooth (right).

guide to selecting the proper thickness.

One good example of this is a rotary drill bit used to drill a hole 90 ft deep. A thin cutting edge used in average soil conditions cuts at the rate of 30 fph and wears out in 1 hr. The same drill with a layer of surfacing three times as thick drills through 90 ft of the same ground without resurfacing but takes 9 hr to complete the job. Under these circumstances, the additional cost of direct labor outweighs the cost of resurfacing, and a thin surface proves more economical.

#### Selecting Materials

The deposit is selected in the same manner as an electrode for maintenance repair.

On nine out of ten applications, hardsurfacing must resist wear due to abrasion in combination with impact. Selecting the right type of deposit becomes a matter of choosing one that will give maximum abrasion resistance and yet withstand impact. Cutting blades that work in materials having small particle sizes require an overlay entirely different from that for work in rocky soil.

Final selection is usually a compromise: Abrasion resistant deposits have less resistance to impact, but the toughest deposits do not stand up well under highly

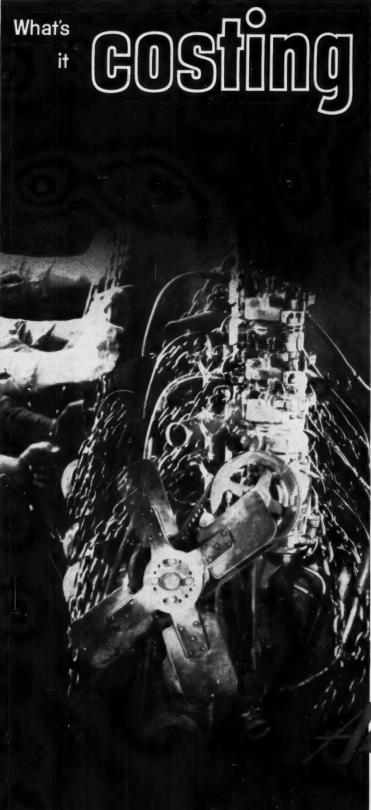
abrasive conditions. Fortunately, extreme conditions of both abrasion and impact generally are not found in the same place.

Hardsurfacing deposits that best resist abrasion contain small particles of carbides held in a tough metal bond. The carbides may be tungsten, chromium, or other hard alloys. Both the carbide particles and the bonding material have high abrasion resistance and moderate toughness. Deposits of this type usually crosscheck on cooling. If cross-checking impairs the function of the deposit, it becomes necessary to compromise on a semi-austenitic material. In this case some abrasion resistance is sacrificed to eliminate the cross-checking.

#### Selecting Electrodes

On occasion, the type of machine part or its position can be a controlling factor in electrode selection. It is difficult to produce a satisfactory overlay with the arc process on a very thin edge. For such applications, the brazing process gives better results. In brazing, a carbon arc supplies the heat and fuses a thin layer of material to the surface being overlaid.

The hardsurfacing material is a powder containing a high percentage of alloys and all the ingredients for a highly abrasionresistant deposit. The powder is



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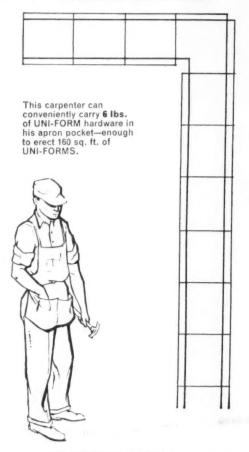
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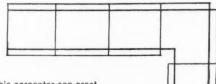
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Carpenters can form more contact area per hour with UNI-FORM Panels than they can with any other prefab form system. The reason? It takes less hardware - in most cases, 50% less - to form a given contact area. And UNI-FORM hardware weighs less, costs less, and is easier to install.

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Cost of hardware required to install 1 UNI-FORM Tie: LESS THAN 4¢. (Tie Keys are re-usable)

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This carpenter can erect only 60 sq. ft. of a competitive prefab system's panels with the 6 lbs. of hardware he carries in his apron. Extra trips for hardware means less productive forming time.



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A leading competitive prefab form system requires 2 tightening wedges and 2 connecting bolts per tie installed. In 6 lbs. of this hardware, there are only 24 sets of wedges and bolts—enough for 12 ties. 12 ties will assemble only 60 sq. ft. of this system's panels.

Cost of hardware required to install 1 competitive tie: 36¢.

(Wedges and Bolts are re-usable)

WHICH PREFAB FORM SYSTEM GIVES YOU FASTER FORM ERECTION AND LOWER COSTS? Want more information about UNI-FORM Panels and the advantages they can bring to your concrete forming? Write today for complete details.

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FORM

continued

evenly spread over the area to be surfaced prior to applying heat. This works fine on flat, horizontal surfaces, but it is troublesome on curved, sloped, or vertical applications.

Most hardsurfacing electrodes are limited to flat position operation for satisfactory results. Wearing qualities are usually sacrificed by operation in other positions.

#### **Applying Materials**

Welding procedures and deposit shape greatly affect hardsurfacing. High welding amperages and hardsurfacing generally do not mix. Most hardsurfacing electrodes require about 50% less current than do mild steel electrodes of the same size. This is an important fact to remember because too high an amperage can impair the electrode's operation, cause excessive dilution with the base metal, and develop undesirable residual stresses in the hard-surfaced part.

Multiple-layer deposits contain more alloy than single-layer deposits, and have better wear resistance. But each type of hardsurfacing deposit has a definite thickness limitation. If the restrictions are exceeded, the deposit will pull away from the base material when it cools or chip off immediately after being placed in service. Thickness limitations vary directly with the deposit's ability to withstand impact. The type of self-sharpening edge being built up usually controls the thickness limitations.

Where excessive wear has occurred, producing a new self-sharpening edge requires rebuilding with a tough, low-hardness material lightly overlaid with an abrasion resistant material. The toughness of a deposit can be increased somewhat if the cooling rate during rebuilding and surfacing is reduced. But this tends to lower the abrasion resistance slightly.

Occasionally, precautions must be taken to control distortion during the welding cycle. This is especially true where surfacing is performed on only one side of the neutral axis. For these cases, properly executed welding procedures, jigs, and fixtures can keep the work within tolerable limits.

## Cut "downtime"— and maintenance costs with time-saving OTC pullers



#### **EXAMPLES:**

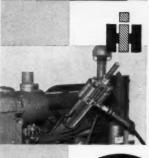
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## PULLING D-9 FINAL DRIVE PINION FLANGE

Four OTC tools combine to hydraulically handle this otherwise difficult, time-consuming job: (A) push-puller, (B) push-puller legs, (C) male-female adapters, (D) 17½-ton ram and hydraulic pump assembly. One of many Caterpillar pulling jobs handled safely and easily with special OTC tools.



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A labor-saving tool for pulling precombustion cups on all International diesel engines, including models D-236 and D-282. Expandable adapters assure positive inside grip, will not slip regardless of cup condition. Pre-cup puller sets are available for either hydraulic or manual operation.

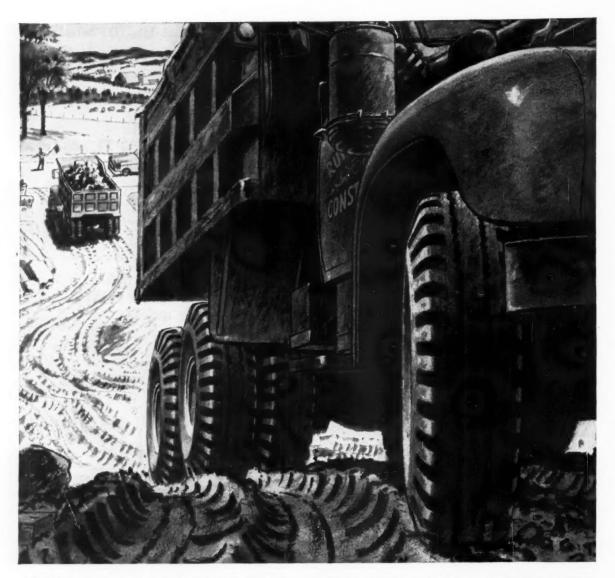


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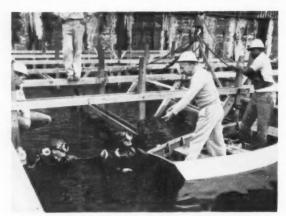
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### Methods Memo . . .



#### Frogmen Sink To Build in the Drink

Two professional skin divers helped build foundations in 14 ft of water in Torrance, Calif. The Fluor Products Co. was installing cooling towers for a hydrogen plant there, and a filled emergency water reservoir was the only place they could put them.

The foundations were first assembled in four sections on the ground. Then a crane lowered each section into the water, and the divers bolted it to existing piers. The divers had to work almost by touch because the water had been treated with chemicals and was cloudy.

#### **Putting the Strain on Safety Nets**

The National Safety Council has just completed a safety-net testing program to obtain data for use in safety codes for heavy construction. The tests were performed on 38x50-ft nets suspended on scaffolding 12 ft above ground. Loads were applied by dropping 2,000 lb of sand bags from a height of 25 ft and 1,400 lb of sand bags from 38 ft.

Many safety codes in the past required the use of  $\frac{1}{2}$ -in. manila rope on 4-in. centers. But the testers found that nets of  $\frac{3}{8}$ -in. manila on 6-in. centers were adequate. Such nets weigh only about  $\frac{1}{3}$  as much as the heavier ones. The tests also showed that diagonal mesh was superior to square mesh.

#### "Plan Bulldozer" Gets Award

The Chamber of Commerce of the United States presented its Award of Merit to "Plan Bulldozer"—the Associated General Contractors' disaster relief program. Erwin Canham, president of the Chamber, presented the award to AGC president John A. Volpe of Malden, Mass. The award cited the AGC "for significant contributions in the business and public interest"

Last year, earthquakes and landslides in Montana created a disaster in the Yellowstone Park area, and the Montana Contractors Assn. put "Plan Bulldozer" to its first, and successful, test (CM&E, Oct. 1959, p. 198).

#### Soviet Dam May Improve Climate

Building a 5-mi dam across the Nevelskiy Strait on the east coast of Asian Russia may change the climate in that area, according to a plan developed by the Soviet engineer, Nikolay Romanov.

Special one-way gates in the dam would let in the warm tides of the Sea of Japan and prevent the warm water from flowing back out. The water, in turn, would warm the air in the surrounding region and put an end to severe winters, never letting the temperature drop below 30 deg Fahrenheit.



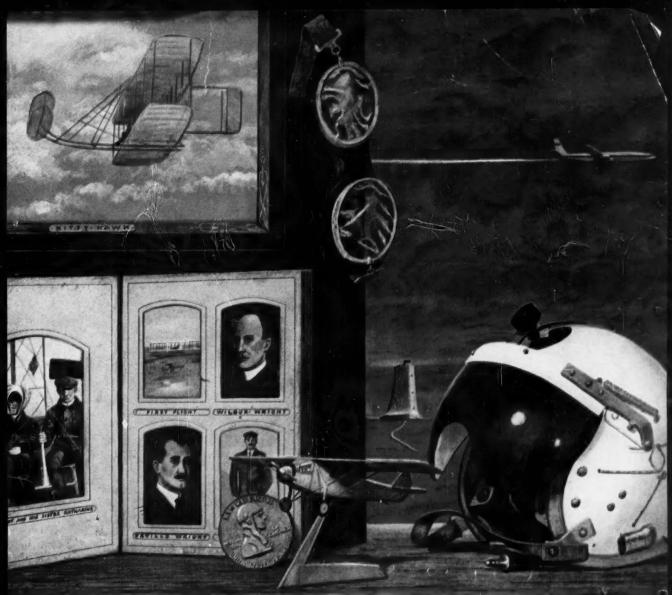
#### Umbrella Roof Hits the Ground

Two corners of an inverted hyperbolic paraboloid roof collapsed recently putting a uniquely designed Dallas service station out of commission. Neither the architects, the owners, nor the contractor know what caused the collapse of the \$90,000 structure. The owners plan to rebuild it using the same type roof because the station is part of a modern industrial development, and its design has to blend with that of the surrounding buildings.

Speculation as to the reasons for the failure seems to point to two possible causes: adverse weather during concreting and nearby heavy construction activity.

The roof was poured last winter, and high winds and rough weather hit the area while concrete was still in an uncured state. Recently, highway contractors were drilling pile foundations for a nearby expressway project, and vibrations in the bedrock may have affected the roof.

One portion of the 70x70-ft umbrella fell about 7 a.m. on May 9. This was followed by cracking, pinging, and popping noises, and the second section fell a half hour later. No one was hurt, but a car was scratched slightly by flying glass. A police officer at the scene said it was "like watching a big concrete flower wilt, a petal at a time."



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